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TELEPHONE ENGINEER

VOLUME XXVI MARCH, 1922 Number 3

Strowger Automatic and the General Manager

However economical in operation a certain type of central office telephone equpment may be or however excellent the service standards which are capable of being maintained by its use, such equipment will not find favor with the executive upon whom the responsibility for the proper management of the property rests, if the maintenance of such standards of service and economy involve troublesome and expensive operating problems.

The General Manager of a company operating Strowger Automatic is fortunate in that the possibility of labor trouble has been discounted to the utmost, and even should such trouble occur its effect upon the service or the volume of traffic in the exchange is negligible.

Managing executives of telephone operating companies are frequently prompted to recommend the adoption of Strowger Automatic because they realize that they will be free to devote their time to constructive effort rather than to corrective or preventive measures.

Others who recommend Strowger Automatic do so because they know they are placing at the service of their subscribers the best telephone equipment that money can buy.

Whatever the reason behind the recommendation may be, the decision is invariably justified.

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LEADERS IN THEIR TYPE.

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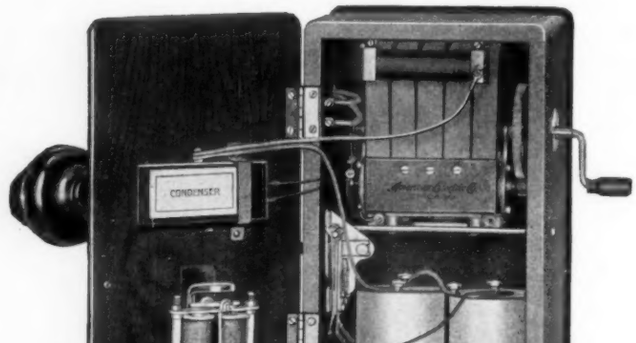
All parts of this telephone are of the standard designs which have proven their superiority through years of use.



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The simplicity of mechanism in these desk stands is the feature worthy of your attention.

Ask for full data on the Burns' Rubber Cushions for Desk Stand Bases—something new. Made to fit standard makes of desk stands.

The No. X69 Magneto Wall Telephone is made up with enclosed gongs—a new arrangement of parts—the latest standard practice. Smaller and neater cabinet.

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The No. 114 Automatic Telephone is made up with an off-center stand of exceptionally pleasing design, and with correct mechanical construction. This instrument should be investigated by the manager of every automatic exchange.

No. 114

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Practical Plant Problems

Inauguration of a Department for the Discussion and Solution of Plant Engineering Problems, in which your Queries and Suggestions Will Be Welcome

By Charles W. McKay, Associate Editor

Introduction.—The editors of TELEPHONE ENGINEER have long felt that there is a real need for a department dealing specifically with plant engineering problems. The establishment of such a department, at this time, is due largely to the fact that the writer has encountered so many telephone executives who are—and frankly admit they are—somewhat hazy as to the fundamental principles underlying Plant Engineering.

Needless to say, this is not a reflection upon the executives in question—or any others who are similarly troubled. Many of the best telephone managers, and many of the best superintendents, foremen, and other departmental heads, are decidedly remiss—not only as to their knowledge of the fundamental theories of engineering practice, but also as to their ability to put into execution such fundamental ideas as they may possess. Such a condition of affairs is but natural when one appreciates that this is an age of specialization. One who is admirably adapted to managerial and supervisory duties may not have had the training—and possibly may not have the inclination—to enable him to reach a satisfactory solution of the many involved problems incidental to engineering.

Possibly the significance of the foregoing may be made clearer by citing a specific instance. A very good friend of the writer—who, by the way, very nearly realizes the writer's ideal of the "perfect" manager of a medium sized telephone property—attempted to do a little plant engineering, on his own hook, several years ago. The results were most disastrous from economic, engineering and operating standpoints. This manager was laying plans for the rehabilitation of a large and important part of his feeder plant. Had he had the knowledge of the fundamentals of plant engineering—which we hope to present in this course—he would have atacked the problem systematically, rather than by attempting to solve it by-rule-of-thumb methods. However, from the viewpoint of the information he then had available, the cheapest plan (from a standpoint of first cost) very naturally seemed to be the best—and it was adopted. The result: five large, unsightly feeder cables were placed upon a pole line on one of the most important thoroughfares of the city. Even from a construction standpoint the plan adopted showed questionable engineering judgment. The poles were overloaded and, during the winter sleet storms, this line was a constant source of worry to the company's executives, and a very real hazard to the public at large, to say nothing of the danger of jeopardizing the service of the many subscribers cared for by the cables in question.

But the worst of the story has not yet been told. In planning these feeder facilities, the manager made, what seemed to him, a careful estimate as to future requirements, but within two years, from the date the cables were installed, every available pair was in use, and it was a physical impossibility to provide for subscriber growth.

The obvious solution, of the problem in question, involved a careful engineering study of the entire district to be served by the proposed feeder facilities, and a careful weighing of annual charges, and ultimate costs, against first costs. If this manager had been thoroughly grounded in the fundamentals of plant engineering he would have saved his company several thousand dollars, to say nothing of a constant, and very real, worry.

An interesting sequel to this little story is that the manager, himself, ultimately realized the fallacy of attempting to solve plant engineering problems by rule-of-thumb methods, and when he was again confronted by a similar problem, he had the good sense to retain a telephone engineer who was a specialist in the solution of plant problems. This, however, would not have been necessary if the manager had had the means available—and had taken the time necessary to thoroughly ground himself in the fundamentals of plant engineering.

It is thought that the purpose of this department will be obvious, from the foregoing. The department contemplates an intensely practical presentation of the subject of plant engineering, also, an advisory service in connection with the solution of specific problems. It is hoped that readers will feel free to write the editor in charge of this department regarding any problems, the solution of which may be effected through an interpretation of the text of this series of articles. Information of this nature will be gladly given—providing,

of course, that the questions are of such a nature that they can be answered without visiting the plant in question. In other words, we will give you all possible aid in the way of helping you to solve your own problems—but, for obvious reasons, we canot commit ourselves to the expenditure of the time and effort necessary to solve them for you.

Scope of Department.

One of the most interesting things about the telephone business is that, no matter how small a plant may be, it presents essentially the same engineering problems as those encountered in connection with the largest and most complex property. Even the executive of a company serving but a few hundred subscribers is occasionally confronted with the problem of planning a house cable system for a comparatively large building; the problem of designing new feeder systems, and the ever present problem of providing for future subscriber growth. One function of this department, as already suggested, is to aid the executives of the smaller companies in effecting an adequate solution of their own peculiar plant problems. The editors of TELEPHONE ENGINEER had still another thought in mind in planning the department. Many employes of the larger companies—who, perhaps, are engaged in strictly operating work—are endowed with an "engineering" turn of mind, and once given the opportunity, would develop into excellent plant engineers. There are many openings in this field, and it is thought that a course of this nature should fill a long felt want in providing a means of "self-education" to telephone men who wish to fit themselves for engineering work.

The writer knows of an instance where a plant superintendent, who had a natural aptitude for engineering work, made a special study of plant and equipment engineering problems, with the result that he was subseqeuntly appointed to the dual office of general manager and chief engineer.

To summarize, then, the scope of the work outlined for this department includes:

1. The presentation of a series of practical articles on Plant Engineering, for the purpose of:

   (a) Aiding the small company executive in solving his own problems.

   (b) Helping large company employes to better themselves.

2. Answers to specific inquiries from readers.

3. A discussion of such current problems as may be suggested by inquiries from readers where such discussion will prove profitable to all.

History of Engineering.

As an introduction to our subject, it may be well to consider, briefly, the history of engnieering. The Standard Dictionary defines the verb "engineer" as follows: 1. To put through or arrange skillfully or by contrivance and effort; as, to *engineer* a scheme; 2. To plan and superintend the construction of, etc. The noun "engineer" has been defined, thus: 1. Engineer: one who economically directs man-power and by scientific design utilizes the forces and materials of nature for the benefit of mankind; 2. One versed in or practicing any branch of engineering.

In telephone parlance, the term "engineer" is used in its broadest sense. The telephone plant engineer is called upon to "put through, arrange skillfully" or to "plan and superintend the construction of" telephone work—rather than to apply a highly technical knowledge of the science of electricity, as applied to telephony, and the correlated branches of physics which have to do with sound transmission, etc. These latter engineering functions are usually well performed by the engineers of the manufacturing companies specializing in the production of telephone apparatus. In other words, the operating plant engineer is frequently called upon to design a feeder or distribution plant, but he is never required to design a telephone switchboard or any of its auxiliary equipment.

So much for the definition of engineering. The history of the art is most interesting. Centuries before the invention of the telephone, the science of engineering was recognized and, in some of its branches, had reached a high degree of perfection. For instance, history tells us that the Romans were very good civil engineers, as evidenced by their work in the construction of aqueducts and roads. Many of the roads built by Caesar are still in use in France and Italy. In the early days of our own nation George Washington attained fame as civil engineer, long before he was known as a statesman. The first real progress in engineering, however, was made during the latter part of the Nineteenth Century—as evidenced by the invention of the telephone and the perfection of electric lighting and power transmission facilities. The Twentieth Century has witnessed the evolution of many remarkable engineering works, such as the aeroplane, the submarine, wireless telephony, etc.

Divisions of Telephone Engineering.

Telephone engineering may be divided into three, albeit rather comprehensive, classifications:

1. Plant Engineering
2. Commercial Engineering
3. Equipment Engineering

A possible further subdivision might be made under the caption, "Traffic Engineering." In our present discussion, we will confine ourselves to Plant Engineering and, to certain phases of the closely allied subject of Commercial engineering.

The function and correlation of the three branches may, perhaps, be made clearer with the aid of a simple illustration. A few years ago a large corporation built an extensive plant in a certain middlewestern town. Prior to that time the town was relatively small, with no distinctive industrial activity. The establishment of the industrial plant brought about a large, immediate increase in the population, and all indications seemed to point towards a fairly large rate of growth in the five or ten years succeeding the establishment of the plant. The engineers of the company providing the telephone service, naturally, were confronted with a very serious problem. The telephone plant, as it existed prior to the erection of the industrial plant, was entirely inadequate. Furthermore, the engineers had no accurate knowledge as to just what the subscriber development would amount to. The first step in the solution of the problem involved a commercial study. A squad of engineers was assigned to the task of making a detailed canvass of the whole city, noting the location of present telephones, the various classes of service rendered, and the prospects for future telephone development. Each city block was analyzed by itself. The field men were guided by instructions, drafted by the Chief Engineer, as to the proper classification of the various telephone prospects. This was done largely on the basis of property rentals. If a man was paying a rather high rent, the telephone engineers assumed that he would sub-

scribe to single party service. If he was paying a more moderate rent, it was assumed that he would take two or four party service. In the case of undeveloped property, it was possible to obtain some idea of what the future trend of the real estate development would be, by interviewing the owners of the property. This commercial study was made with a view of determining, not only the present telephone requirements, but also the ultimate requirements for a 15-year period. The results of the commercial study were assembled on maps, and by a careful analysis of all the data it was possible for the engineers to determine the number of central offices required, the locations of the central offices, and, in a broad way, the general outline of the feeder and distribution systems. This practically completed the task of the commercial engineer and the solution of the problem was carried on from this point by the equipment engineer and the plant engineer.

The problem of the equipment engineer was to determine the type and the size of the central office equipment and to prepare detailed specifications for guidance in its purchase.

The task of the plant engineer consisted in taking up the fundamental plans and tentative studies at the point where the commercial engineer dropped them, and evolving detailed plans and specifications for building the plant. Both the work of the commercial engineer and that of the plant engineer were influenced largely by existing conditions. The first draft of the fundamental plan undoubtedly was modified to provide for a maximum use of existing conduits, cables, and pole lines.

In laying out the plant, it was necessary for the plant engineers not only to provide for immediate requirements, but to so design each part of the plant that it would form a useful unit in the ultimate scheme, and this, by the way, is one of the most important factors in plant engineering and one of the strongest arguments why every telephone company, no matter how small, should be possessed of a carefully made fundamental study of its plant. It is a comparatively simple matter for a plant manager or a construction foreman to lay out a new pole line, or a small aerial cable system, that will meet the present requirements. Unless, however, he has in mind an ultimate plan towards which to work, the plant manager some day undoubtedly will be confronted with the fact that parts of his plant involve useless duplication, or perhaps are entirely inadequate to serve the purpose for which they were originally designed, and therefore worth little more than their junk value.

In a very broad way, we have outlined the respective functions of the commercial, equipment, and plant engineers—at least in so far as their relations to new work are concerned. We shall next take up a more detailed consideration of each of these phase of telephone engineering work.

NEBRASKA CONVENTION.

Farm Products 40% Above Pre-War Levels; Telephone Rates But 25%.

The convention of The Nebraska Telephone Association was held at Hotel Lincoln, Lincoln, Nebr., Feb. 23–24. "Government ownership and commission regulation of telephones have been thrown into the discard in some communities in Nebraska," said President Bruce Brown of Brady, addressing the meeting. "In their place we have direct action, strikes. It has been impossible to reason with those behind them, but it seems to be a popular method of regulation in Nebraska." Continuing, Mr. Brown said that it presented a serious situation for small exchanges, because they have no unlimited supply of capital and lack the experience of the big companies in handling the public. The cause, he said, was lack of appreciation of the telephone man's problem by the public. The remedy was education, but the managers and owners must educate themselves first. They have spent their time putting up poles and stringing wires and have neglected contact with customers. Mr. Brown, from the annual report of the railway commission showed that the dividend paid in 1920 on the five million dollars invested by the smaller companies of the state was 1.8 per cent, and said the record shamed them as business managers. He said one striking feature of mob action on rates was that in no case did the objectors offer to buy out the owner; they simply didn't care whether rates were reasonable or not, their prices were down and an arbitrary offer was all they would pay.

Thursday afternoon, C. C. Dering, Secretary of the National Association, outlined the need for organization and better public relations. Then came a paper by P. M. McCullough, engineer of the North Western Bell Telephone Company, a masterpiece, describing the various causes of decay and methods of prevention, giving in detail the brush, open tank and puncture processes. He said the available supply of poles was being used much faster than they could be grown and unless preservative methods were adopted our pole supply would be exhausted in 80 years. The banquet proved to be a most enjoyable affair. The table decorations consisted of a miniature pole line of four wires and telephones at each place, with an explanation as to why the service was temporarily suspended. An orchestra composed of employees of the Lincoln Tel. & Tel. Co. furnished the music and a male quartette from the same company led in the community singing, in addition to rendering several original numbers. Miss Alice Tangeman, of the Traffic Department gave a reading and Mrs. Brewster rendered two solos.

Commissioner Brown Calls Commissioner Bryan.

Friday morning, a full hall listened to the presentation of Public Relations, From the Subscribers' Viewpoint, by C. W. Bryan, City Commissioner of Lincoln. Mr. Bryan argued that, theoretically, the utility is in a favorable situation because assured by the Railway Commission of a fair return on its investment while the public has no such guarantee. He then launched an attack on the actual practices of the State Railway Commission and cited several alleged instances where the commission instead of protecting the interests of the public protected the utilities. He was of the opinion the commission had outlived its usefulness. Thorne A. Brown, of the Nebraska Railway Commission, took exception to the statements of Mr. Bryan and in several instances pointedly challenged their accuracy. Said Mr. Browne: "If we should use the price of a bushel of corn as a basis for telephone rates we would have ever changing conditions, and if that is a reasonable method we also should have to charge according to the ability of the subscriber to pay, the widow with three children being charged less than the family next door who is more fortunately situated. In wartime, corn at $1.75 per bushel represented an increase of more than 300% over the prewar rate while the peak increase to telephone utilities was 30% and today is but 25% while farm products are still 40% above prewar levels".

L. B. Wilson, General Commercial Superintendent of the North Western Bell Telephone Co., then told of various methods of getting in closer touch with the public. He cited a conversa-

tion with a gentleman who was violently opposed to an increase of rate to the traction company. Said Mr. Wilson: "I asked him where he did his banking and he named a bank across the street on who's window was the sign, 'Capital $500,000. Surplus $500,000.'" Then Mr. Wilson said: "Doctor, I am unable to understand your attitude toward the traction company. You say this bank is a fine institution yet they advertise that they have accumulated a surplus of $500,000 from handling money belonging to the public. How much would your property be worth if it were not for the transportation facilities which you now enjoy? Of the two, does not the traction company render you the most valuable service?" The Doctor confessed he had never thought of it in that way. In conclusion, Mr. Wilson suggested that one's rule of business might well be: "Do unto others as you would that they should do unto you."

At the closing session, M. T. Castor read a paper on "Inductive Interference from Power Lines" and emphasized the necessity of meeting the power companies on a fifty-fifty basis. O. E. Johnson, of the Nebraska State Railway Commission's accounting department, gave an interesting talk on accounting and thanked the telephone men for their cooperation in putting the system into effect. In the closing discussion, led by B. G. Miller, of Crete, J. W. Richmond of Wisner, and W. Johnson of Kearney, was evidenced a strong desire for an active association and sentiment seemed to favor employing an active field worker. The association's officers are to work out the details of the plan. All old officers were reelected with the exception of some directors who have left the state. The list follows: Bruce Brown, Pres., Brady, Neb.; Geo. E. Becker, Vice-Pres., Pawnee City, Neb.; W. S. Clapp, Vice-Pres., Kearney, Neb.; R. E. Mattison, Sec.-Treas., Lincoln, Neb.

Florida Telephone Association Holds Its 13th Annual Meeting.

At the annual meeting held in Tampa March 2-3, Pres. W. G. Brorein, of the Florida Telephone Ass'n, pointed out that thirteen years ago the state association was born in Tampa. He told of the telephone's part in the development of the state. Twenty years ago, there were but 500 telephones and no toll lines in use south of Jacksonville. Today there are 40,000 telephones in use, and every community is connected by wire. During the meeting a committee was named to keep in touch with the smaller companies and furnish them with helpful information. On the committee are F. W. Webster, Miami, chairman; A. B. Steuart, Tampa; R. L. Boyd, Jacksonville; C. H. Galloway, Winter Park, and Carl Brorein, Tampa. All officers of the association, President W. G. Brorein of Tampa; Vice-President W. L. Moor, Tallahassee, and Secretary Frank D. Moor, Tallahassee, were unanimously re-elected. E. E. Voyle, Gainesville; F. W. Webster, Miami, and R. H. Magill, Moore Haven, were named members of the executive committee. Addresses were made by Dr. W. L. Moor, of Tallahassee; E. E. Voyle of Gainesville; A. B. Greene, Telephone Engineer of the Florida commission; F. B. MacKinnon, President of the U. S. Independent Telephone Ass'n; R. L. Boyd, district manager of the Southern Bell T. & T. Co. at Jacksonville; J. L. W. Zietlow, of Aberdeen, S. D.; W. H. Adkin, F. W. Webster and others.

SOUTH'RN NEW ENGLAND.

Company's Report for 1921—One Phone for Each 7.5 of Population.

The annual report of the Southern New England Telephone company shows that the increase in stations for 1921 was 9,687 or 5.4 per cent, as compared with an increase of 16,671 or 10.3 per cent during 1920. The total new station installations was 29,344, the difference between that figure and the net increase representing the number of stations discontinued for one reason or another. At the close of the year, the company was operating 186,057 stations, in addition to which 5,746 Connecticut stations were being operated by associated and connecting companies, making a total of 191,803 within the state, or one telephone for each 7.5 of population. The reduced growth in telephone stations was attended with even less proportionate growth in traffic. Local traffic, or calls between subscribers in the same exchange, as estimated from periodic traffic counts, numbered 264,581,000 calls as against 260,382,000 in 1920, while toll traffic numbered 10,248,000 calls as against 9,876,000. Thus the increase of 4,571,000 in all calls compares with an increase of 36,439,000 in 1920 over the preceding year and is obviously small. Nevertheless, the public of Connecticut used the telephone on the average of 753,000 times daily. Wire mileage was increased by 84,718 miles to a total of 601,369, and the number of exchange circuits or tracks over which local service is furnished was increased by 8,440 to a total of 95,583.

The capital stock authorized of the company is $20,000,000, of which $15,000,000 has been issued. Similar authority is being asked in relation to the remaining $5,000,000, of which amount $3,000,000 will probably be used in financing plant additions during 1922 and in the reduction of bills payable to the American Telephone and Telegraph Co., from which the company had loans of $2,962,043 at the end of 1921.

The report shows a balance net income of $1,290,627.53 and appropriations of net income for dividends of $1,196,794.00, leaving a balance for corporate surplus of $93,833.53. Other statistics are as follows:

	Dec. 31, 1920	Dec. 31, 1921
Common Battery Stations	173,265	182,701
Magneto Stations	3,159	3,356
Central Offices	79	79
Exchange Circuits	87,143	95,583
Miles of Wire	516,651	601,369
Stockholders	2,528	3,674
Employees	3,810	3,692

Tri-State Pays Quarterly Dividend.

The Tri-State Telephone and Telegraph Co., of St. Paul, Minn., has paid its 75th quarterly dividend of one and one-half per cent to holders of preferred stock. In the annual report of Pres. G. W. Robinson, the gross earnings for the year 1921 were shown to be $4,150,876.59 and the balance available for interest charges and return of outstanding stocks $609,114.78. The financial showing for the full year was adversely affected by the low rates and high operating costs prevailing during the early part of the year but a very material improvement was realized through the increased service charges granted by the Federal Court which became effective during the latter part of the year. A sum equal to 5 per cent of the depreciable property was set aside to protect the properties against depreciation. It is felt that the Tri-State now is fairly well fortified and Pres. Robinson is receiving many congratulations on his hard fight for his company's rights.

FOR SALE—Exchange of 600 phones. Entire system in first-class condition. Location Oklahoma. Will sell so it pays 30% net. Ask Hugh Conner, Hutchinson, Kansas.

Telephones, Oranges and Oil

A California Story—A Story of Men and Affairs—A Story of Life as We Meet It; With Telephone Lines Strung Alongside—All of Same Being Evoked by a Recent Gathering Out West

By J. C. Kelsey

"He noticed nothing in it to remark
He was not used to handling stars thrown dark
And lifeless thru an interrupted arc.

"He moved it roughly with an iron bar
He loaded an old stone boat with the star
And not, as you might think, a flying car.

"He dragged it thru the plowed ground at a pace
But faintly reminiscent of the race
Of jostling rock in interstellar space.

"It went for building stone and I, as tho'
Commanded in a dream, forever go
To right the wrong that this should have been so.

"Yet ask where else it could have gone so well,
I do not know—I cannot stop to tell
He might have left it lying where it fell."

Aubrey Wardman was born in Canada forty-five years ago.

At an early age he went out into the world to carve his way and fortune.

Before he was nineteen years of age, he was foreman of a line gang which helped to build the original Independent telephone plant at Detroit.

When this work was finished, he next appeared at Cleveland and laid some of the corner stones of the Cuyahoga Telephone Co.

And later, in 1902, Mr. Wardman and his family came to Los Angeles, and he took part in the construction of the Home Telephone Co., of Los Angeles, under Charley Zahm, a pioneer builder, who played such a large part in the early construction of Independent telephone systems.

And in the early days, Independent telephone construction companies often ran out of money and Mr. Wardman had many leisure hours.

It is no fun to be three thousand miles from home, out of work with scarlet fever raging through the family and with a heartless health officer patrolling the block to maintain quarantine.

But so often in the lives of courageous men, something always follows the darkest hour. There is nothing so true as the old saying that "it is darkest, just before dawn."

Charley Zahm called up and asked Mr. Wardman if he would go to Whittier and take care of a telephone system in process of construction.

Would he? Well, ask yourself—

Now here is where the story of the "star, thrown dark and lifeless thru an interrupted arc," comes in:

Mr. Spencer was a Los Angeles man, who controlled the Independent Construction Co. and was building Whittier, Downey and Alhambra.

But there is something in the modern life, which attacks men between the ages of 42 and 46, and while science has found a way to prolong a man's life, it is to be admitted that these five years of a man's life have not yet submitted to scientific treatment.

Spencer sickened and died—in the prime of his life—undermined by worry, anxiety and unceasing activity; and by thinking always of just one thing—business!

As is always the case, the widow, not understanding the business, wished to dispose of her property

At that time, Whittier had eight hundred telephones and Downey one hundred and seventy-five; not large plants in today's measure but some large contract as far as Aubrey Wardman was concerned.

Mr. Wardman, having no money, had courage and soon made a deal with the unwilling owner, giving her a good price and paying with a series of six-per-cent notes.

He lived economically, as all men should, and worked hard and long. He saw many days of worry and anxiety, because Whittier grew and grew, and so did Downey and the outlying country.

But Aubrey Wardman got used "to handling stars thrown dark and lifeless through an interrupted arc."

Today, he has a property worth $400,000, with 4000 telephones and a fine toll system in a most wonderful country—and *all* his own.

Whittier is called the "Friendly City" and it was named after the poet Whittier who himself was a property owner.

It has a Chamber of Commerce with real courage and energy, and Aubrey Wardman was its president three different times, as well as its secretary.

No subscriber has ever had a quarrel with this telephone company, and the city has ever been willing for the company to earn its 8% and maintain its dignity among the business enterprises of this "Live-and-let-live" community.

But some men have two or more "stars, thrown dark and lifeless through an interrupted arc."

Mr. Wardman finally found himself an owner of a lemon grove.

It was a "lemon" in every sense of the word, and it is said that this able telephone man could not even give it away.

But Aubrey Wardman never retreats—except for strategic purposes.

Today, that same old ten-acre lemon grove gives up 1000 barrels of good oil every day, including Sundays, and the reader must use his own pencil to figure the profits.

But wait a moment: This telephone man, accustomed to handling stars, not with stone boats, but with flying cars, has oil property, it is true, whose possibilities simply stagger men not accutomed to seven figures in a row; yet no one can begrudge it.

Aubrey Wardman "might have left it, lying where it fell"—but he did not.

We have another picture of an oil man coming into the telephone business—a reverse picture.

L. C. Torrance, a native of old New York State, became interested in the telephone system at Santa Monica, Ocean Park and Venice in 1907.

A few years ago, he purchased the Bell property and today the Santa Monica Bay Telephone Co. stands out as one of the most successful telephone properties in the country.

It has 4700 telephones operating at good rates, with a satisfied list of subscribers.

As a side light to a tourist community, this company installed 1445 tel-

ephones in 1921, in order to make a net gain of 779.

It is obvious that the telephone business has a stability that is visibly outstanding—even in places where "men may come and men may go," while seeking climatic rest or surcease from their business cares.

We have yet another typical picture:

Frank Wright was a Kellogg installer who came to California many years ago with Rodney McHugh.

He lives in Covina, a beautiful city, bounded on the north by orange groves and on the south by walnut groves.

It was here that the recent great freeze seemed to strike the hardest—only to those who did not have their lamps burning.

We are all familiar with the story of the five wise and the five foolish virgins, the wise five having their lamps filled with oil.

But the orange grower who heated his orchard saved his crop, while the grower who took a chance lost his.

Frank Wright has never struck oil nor had a lemon grove, but he has made a life-long study of the telephone business.

He is the company's engineer, manager and lawyer, and I must say that I never heard a better presentation before a commission than Frank Wright made last week in asking permission to refund his old securities and sell some new ones in order to make some beautiful and permanent improvements.

The Home Telephone Co., of Covina, with 2,500 telephones, is erecting a new exchange building and installing new switchboards throughout its neighboring exchange centers.

Idaho cedars stand high above the walnut trees, and make a telephone system good to look at—and economical to operate.

Still another picture: I am writing from movieland, you know.

The Pomona Valley Telephone and Telegraph Union operates 6,000 telephones, gains ten telephones a day and has beautiful exchange headquarters at Pomona.

Like Covina, it is bounded on the north by orange groves and on the south by farm lands.

The company is spending $100,000 for improvements and additions and is installing new switchboards in four new buildings at its branch exchanges.

The ruling figure of this company from its conception was that tireless spirit, Parker, whose devotion to the telephone business cost his life while in his prime.

He is succeeded by Carl Lorbeer, who grew up from boyhood in the company, and who promises to be the most worthy successor to the Parker mantle.

Mr. Lorbeer is vice president of the California Telephone Asociation and very active in Pomona's commercial bodies.

Our final picture is Redlands:

Redlands is entirely surrounded by orange groves.

It is the most beautiful part of Southern California.

To this town there arrived a man who probably has made the greatest impression upon California telephone history.

No man has made a greater success than Charles A. Rolfe.

Coming from the East, he took the badly mixed, though promising, Southwestern Home Tel. Co., bought out the Bell Company, and made a signal success of the business, in spite of difficulties which would have stopped any other man.

Mr. Rolfe's company has the highest earning per station. How many telephone companies can point to $42 per station a year?

In 1921, there were but two real rate cases fought out in California.

The Southern California Telephone Co., of Los Angeles, finally received a raise in rates, and a week later Mr. Rolfe's company also received one.

To one living away from California, it probably will be difficult to show just how much nerve and energy it takes to go after high rates there.

Southern California is peopled with retired farmers from Iowa, Kansas, Illinois and other scattering states.

They do not have any too much to spend and they have to husband it to the last degree.

Besides, they do not have anything to do except to protest—and they are the greatest little protestors in the world.

It so happened that the California Railroad Commission authorized an increase in telephone rates and street railway fares at the same time.

Naturally, there was terrible indignation which, with some ambitious city appeals, made quite a noise.

The governor of the state, a candidate for re-election, got awfully nervous—because all these ex-Iowans and Kansans vote—and he finally persuaded the commission to grant a public hearing.

Over 1000 indignant people attended that hearing, and every time some protesting witness told how the wicked telephone company was, there was great applause.

One witness, 85 years old, tottered up to the witness stand and nearly had convulsions as he told how the Cruel Company made him pay a quarter penalty because he waited till after the fifteenth of the month.

Another told how his bell would not ring or the line was always busy—you'd be surprised to know how many sins the company was guilty of.

Well, after the mob had had its say, and felt better, the commissioners, five able, conscientious and courteous men, themselves on trial before this horde of angry subscribers, went home, and after cooling off, notified the people at large that the new rates would stand.

Curiously enough the city's case collapsed over night, and now every one feels better.

The Bell officials behaved wonderfully well under fire. They have an unusually brilliant lawyer by the name of James Shaw, a man of infinite courtesy, knowledge and patience.

Every telephone man knows that a waiting list of 20,000 telephones, on top of a consolidation of two unlike systems, is going to give some one a headache.

It would have served Los Angeles right if the company had shut down for a week or so; sometimes strikes work both ways.

This ordeal of the Railroad Commission of California sitting on trial before 1000 angry people at a telephone hearing, and probably 1500 at the street railway hearing; this spectacle of a regulatory body being insulted by school teachers, who seemed to take the most active part, and other cheap souls who never sat on a stage before, reminds one of what Theodore Roosevelt said long, long ago.

The first chairman of the California Commission was a popular man by the name of Eshleman.

To those who are familiar with rate cases, the name of Eshleman first prominently appeared in the San Jose case.

Roosevelt and Eshleman were friends, and what Theodore said when they first met is so true as to reveal distinctly the prophetic power of our late president.

"Your first task," he said, "will be easy. Elected, as you will be, under a movement responsive to the people,

and independent of the corporations, you will find it easy to reduce rates where they are too high, and you will find many rates *are* too high. Your real task will come later when you have to do justice to the corporations and raise rates in spite of the public clamor to lower them. The test of public regulation will be the ability of independent men to do that, and to maintain popular confidence in doing it."

Did you ever read a more prophetic thing?

Little did Roosevelt realize the changes to come by reason of the war.

Little did he realize that the American dollar would descend in value until it could buy almost nothing unless, possibly, public utility service.

Little did he realize that each descending dollar would cost the public utility corporation just as it caught each individual.

Yet while the business man could meet the descending scale of the dollar by raising his prices, the public utility had to seek permission to do so.

Seeking permission to do so takes time and money. And so to public utility companies came the double strain of descending dollars and uncalled for expense in getting permission to neutralize them.

Today, newspapers are full of news of descending prices.

It is time that corn, wheat, beef on hoof and such are lower but who can say that rents are lower or taxes down? Much that our employes wear or eat is still too high.

That howling mob in Los Angeles felt telephone rates should be down, instead of up, because it had read in the newspapers that "things had gone down."

To that Board of Railway Commissions it was pitifully plain that the mob was not properly informed.

It looked that day as if popular confidence in Commissions was on the wane—if one could judge from the uproar in the meeting place.

But not one angry telephone subscriber would consent to the abolition of the commission. In his heart he knew that once public regulation gave way to uncontrolled rates, he would pay double.

Public utility regulation is here to stay.

There have been many changes in the telephone business.

Of course, change is not confined to the telephone.

Everything changes as time goes on, and new problems confront us every day.

I have just read of the sale of the Citizens Telephone Co. of Michigan to the Bell interests; also, of the sale of the Kinlock Telephone Co. of St. Louis.

It is hard to see these old landmarks removed; yet to those who think, it is plain that these companies were doomed and doomed because of lack of capital.

Bradstreet's and Dun's both tell us that 40% of all enterprises fail from lack of capital; so that we may bow to the fact that our two proud Independent companies died of normal diseases.

Lack of capital is a widely prevalent disease.

I just noticed a clipping from a paper in which the manager of a Bell company at Shenandoah, Pa., is quoted as to the desirability of a subscriber owning enough stock in the company to enable his dividends to pay his telephone bills.

I think the most practical way of looking at this question is a way, whereby the subscriber of a telephone system will automatically finance the extensions of the company's property to take care of the new subscribers.

It is really a matter for the state controlling bodies, since, by their decisions, they either make it possible to finance a company—or the reverse.

Up to a few years ago, the normal extension money required by a telephone company amounted to $6.00 per year.

The state utility regulatory bodies could be urged to grant a $6.00 raise upon every telephone rate in the state, but instead of the company retaining this $6.00 in their treasury as an earning, it could be credited as a payment on a new share of stock or bond.

When this sum amounted to $25.00, then a share of stock at that face value could be issued to the subscriber and his account charged with the stock.

Or, each bill rendered could have a coupon attached, and when the subscriber had accumulated enough of them, to make up $10, $25 or $100, the coupons could be exchanged for the company's capital securities.

There is no use beating around the bush; each local community must sustain itself.

When a foreign bond house handles your securities, slick salesmen come back and sell them to your own people.

A plan could be easily worked out which would make every utility subscriber, or customer, an involuntary security holder.

And such a plan would solve almost every rate controversy because, if every user of service was a security holder, no one could be found to start a fight.

Such a plan would make rate regulation automatic in character.

To make the plan clearer: Suppose a gas rate was $1.10 per thousand.

The new rate would be $1.35 per thousand, each 1000 feet of gas carrying a 25-cent coupon.

If my gas bill covered 40,000 feet, I would get a $10 rebate in the form of securities of the gas company.

No longer would the gas company have to borrow money at ruinous prices, often paying fifteen cents plus first year's interest for every dollar.

Nor would there likely be any protest when the gas rate went up, so that a dividend might be paid.

Interest might be substituted, if the involuntary security holder preferred it to stock.

There is no denying it.

The problem of the day is finance.

The problem of almost every telephone company is the financial problem.

Los Angeles some day will have to depend upon Los Angeles people for extension money—if they get extensions; and they should be compelled to provide it now.

Covino, Romona, Redlands, Redondo or Shenandoah, Pa.,—the problem is the same. And the user of the service is the one to pay for the extensions by being a stock- or bondholder.

We have all seen the Bell interests grow into the mighty host of today.

We all know that human nature has not changed, and that monopoly is a thing abhorrent to the human mind—even though legalized.

Size does not reduce problems; it only multiplies them.

Moral: Don't leave the star of opportunity lying where it fell.

Illinois Bell's 1922 Expenditures For New Plant Total $2,692,180.

Directors of the Illinois Bell Telephone Co. declared the quarterly dividend of $2.00 per share, payable March 31, 1922, to stockholders of record March 30, 1922. Directors also approved an expenditure of $758,587 for new plant for Chicago and other parts of Illinois, making a total up to date this year of $2,692,180 for this purpose.

OPINIONS AND COMMENTS

SPARE PAIRS.

The value of spare pairs in a telephone cable lies in their being available when needed. A telephone line is reported in trouble; the trouble is traced to the cable; the wire chief assigns a pair which is reasonably clear; the change is made and service is restored. How often the matters ends there! How often that bad pair is the indication of possible future trouble, and still nothing is done as long as spare pairs are still available. Likewise, how much of the time are cable men employed on relatively unimportant work; or even, in the case of smaller plants, on other than cable work. How many cases of cable trouble, resulting in interruptions to service, might be avoided by following up the bad pairs? If the occasional defective pair that shows up in the winter time were cleared up, what effect would it have on the volume of cable trouble that appears when the first spring rains come? An exchange of ideas on this subject would be of interest. Perhaps some of the readers of TELEPHONE ENGINEER can contribute from their experience.

ACCIDENT PREVENTION.

Accident prevention work, like advertising, is most successful when carried on continuously. An accident prevention campaign may show immediate results but will have little permanent value unless followed up by an accident prevention policy. The matter of safety, both of person and property, must constantly be kept before the plant forces. It is probable statistics would show that the number of accidents in the telephone field varies somewhat, depending on the season, due to greater activity of the construction forces at certain times of the year. Telephone companies can well follow the policy of certain advertisers who market a product of seasonable use. The public is not allowed to forget the article by a complete withdrawal of advertising during the off season but the volume of advertising is increased during the period of greatest sale. During the spring, many new, or less experienced, men are added to the telephone plant's working force. The best time for intensive work along accident prevention lines is just at the time when these men are being employed. The matter of safety can then not only again be brought before the older men, who in time may grow careless, but the new men may be trained from the beginning into habits which will make them the best of safety devices—careful workmen.

COMMERCIAL RADIO.

The announcement that the American Telephone and Telegraph Co. is installing a radio telephone broadcasting station on one of its buildings in New York City and will lease the facilities to anyone desiring to use them, definitely puts radio broadcasting into the status of a commercial enterprise. If the business of broadcasting news, musical programs and publicity material can be developed along commercial lines, it would seem that there are also possibilities that the receiving of this broadcasted material has commercial possibilities. Undoubtedly, many people are interested in some of the information that is being disseminated in this way. But they either do not care to invest in receiving apparatus or have not the means or inclination to maintain the apparatus or keep the storage batteries charged and ready for use. A number of telephone companies in the smaller communities already are installing apparatus with the intention of receiving market and news reports. There is a possibility that telephone subscribers would be glad to receive this service and pay a small additional sum if assured that it will be given regularly. Telephone companies may find this service a valuable by-product and may develop a new source of profit through the sale and maintenance of receiving apparatus for those who desire their own stations. Just how this can be worked out depends upon local conditions, and the possibility of securing apparatus licensed for commercial use, but it is an opportunity that may pay handsome returns to the wise telephone man who takes advantage of it.

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THE BELL REPORT.

The annual report of the American Telephone and Telegraph Company is awaited with interest year after year. Representing as it does, a statement of the condition of the largest single unit of the telephone industry, it is taken by the public to represent conditions of the whole industry. The 1921 report which has just been issued sets forth the opinion of President Thayer and the Directors that the year was one of good progress and their reasons are outlined. Compared to other years, 1921 must be regarded as one of progress but the full significance of the showing can only be understood when general business conditions are considered. The year 1921 will scarcely go down in history as one of

prosperity to the country as a whole and by many industries and by the farmer it will be remembered as a period of great depression. In a year that, generally, must be considered below-normal, a group of companies representing approximately two-thirds of the telephone industry in number of stations, shows an increase of nearly ten per cent in gross revenue and of approximately thirty per cent in net revenue. This same group of companies expended over one hundred and eighty millions of dollars in plant extensions, exceeding by thirty-three millions the greatest annual expenditure for this purpose in previous years. New financing to the extent of approximately one hundred and ninety millions of dollars was done and, most remarkable of all, the dividend rate on the common stock was increased from eight to nine dollars per share. If anyone has had doubts as to the stability of the telephone industry, or its earning power under adverse business conditions, this report certainly should set them at rest. The report, as usual, indicates the plans of the company and its future policies. Some of the more important innovations are the formation of a securities company to distribute the stock more widely and a plan furnishing continuous opportunity for employees to purchase stock. The final scrapping of the Kingsbury committment of 1913 is forecast by a discussion of the absorption of the Ohio State Telephone Co. and future elimination of competition by purchase rather than by division of territory and sale is to be expected.

STILL IN THE WOODS.

"We are not yet out of the woods, although we have made some progress during 1921" said a prominent telephone engineer while speaking of the affairs of a Class A company with which he has long been connected. "We have been able to pay our expenses, interest charges and our very modest dividend rate to stockholders with an infinitesimal amount left to add to surplus. If this were the whole story, it would represent a satisfactory state of affairs when business conditions in general are considered, but we have been compelled to make extensions to meet demands for service and no new capital could be secured without paying exorbitant rates for it. As a result, the only funds we have had available for extensions have been the small surplus and the unexpended portion of the depreciation reserve allowance that was made during the year. We could have used $40,000 or $50,000 to good advantage in replacements, but were compelled to reduce this materially as every available dollar was needed for new plant."

While there are many companies that would be well pleased to be in as good condition, it is, nevertheless, a fact that even this well-managed and, in the main, successful company is not yet "out of the woods." Faced with practically an impossible situation as regards the securing of new capital, it was forced to make extensions out of funds available and this resulted in some curtailment of expenditures for replacement. The investment in the property has been adequately protected by the investment in new plant and the service probably has not suffered materially from the enforced suspension of a portion of the replacement program, but this can not continue indefinitely. There results from it a general lowering of condition of the plant that must, if continued, inevitably result in deterioration of service. An unthinking person might ask why the company did not reduce its dividend rate and so provide the funds. This might be answered by the merest tyro in finance, for the treasury of the company must ultimately be reimbursed from funds obtained from sale of securities and everyone knows the difficulty of selling securities when the return is unstable. The company chose the wiser plan and undoubtedly will make its way out when new capital can be secured at more advantageous rates. As a matter of fact, the entire situation might have been avoided, had the regulatory body which allowed an adjustment of this company's rates permitted a charge of an additional $3.00 per year on a single class of service, 4-party residence. This rate would have been as easily enforceable as the rate set and would have permitted a working margin sufficient to have prevented the situation that arose. Most public utility commissions have, honestly, endeavored to adjust rates so that an adequate return on the investment is assured, but in many cases a rate that provides an adequate return is insufficient to attract new capital. Perhaps utilities have been at fault in not presenting this phase of the case in a manner that compelled the attention of their commissions. Wherever may have been the fault in the past, in future rate cases the question of a rate of return that will attract the investment of new capital must be stressed to a greater extent than it has been, heretofore.

QUIT WASTING TIME.

Oregon Commission Calls a Halt on Unwarranted Rate Protests.

The Oregon public service commission has handed down an order affirming the rate increase ordered March 1, 1921, which the public has been paying since that date. "It is right that the people should be informed," says the order, "of the extraordinary manner in which they have been imposed upon and the time of their officials wasted. Not a scintilla of evidence worthy of the name was offered in support of the petitioners." The order further remarks that "had there been no other restriction upon the telephone company than the antiquated provisions found in its franchises, telephone rates would have followed the trend of other commodities during the war, and rates would have been much higher than those now paid, and would have reached their peak three or four years sooner.

"It is manifestly unfair that the utilities, having been deprived of the opportunity to share in the fruits of prosperity, should be expected to bear the full burden of adversity. It is just and equitable, as well as a duty under the law, for the commission to permit the establishment of rates which will enable the utility to earn a moderate return even in times of depression, provided of course that rates are not in excess of the value of the service or greater than the ability of the patron to pay."

Coming conventions are those of Texas at Ft. Worth, March 22–24; of Ohio at Columbus, March 29–30 and of Iowa at Des Moines, April 4–6.

Some Problems of Expansion

Showing Why It Is Important that Communities and Commissions Treat their Utilities Properly and Encourage Them with Such Rates as Will Attract the Capital of Investors

By Frank E. Bohn

Our readers will enjoy the following summary of a talk which Frank E. Bohn, Secretary and General Manager of the Ft. Wayne (Ind.) Home Telephone & Telegraph Co., made January 14 on "Problems of Expansion Confronting Utilities". This was delivered at the second annual meeting of the Indiana Public Utilities Association in conjunction wth the School of Commerce and Finance of Indiana University at Bloomington, Ind.

At the outset, Mr. Bohn very pertinently inquired if there was any private business whose officers would endeavor to expand that business if such expansion were not profitable? In other words: If you had money to invest, would you invest it in stocks that were offered in order to raise money for the purpose of expansion under conditions where no hope for profit existed, but at best a return of merely eight per cent might be expected? Would you be satisfied with anything but a well secured bond, a so-called senior issue, so safeguarded that both your interest and principal were practically guaranteed? If you were already a stockholder of a business that contemplated expansion would you favor expansion if your own holdings should be obliged to take what was left after all preferred returns had been paid, bearing in mind that the best your company could earn would be eight per cent on the total amount of money invested in the business? If, for this new money required to finance your expansion, your company had to pay nine or ten per cent, would you be content to take four or five per cent less for your money already invested in the business?

You would answer emphatically "No"—unless you were in the public utility business. The public utility busines is trying to expand with all the handicaps just mentioned and many more. We know that most of us have ahead a problem of expansion of magnitude and importance such as we never have faced in the past and that, as difficult and as enormous as it may be, we can solve it if we are but given a fair show at the hands of the public; if the public will pay us enough for our services so that it will be worth the effort for us to expand and meet the increasing demands of the public for our services.

Present and Future Demands.

It is estimated, conservatively, that there is now in the United States a shortage of at least one million homes. The growth of the country requires another 350,000 homes each year. All of those homes will require electric light and power, gas, telephone, street car transportation, etc. And the utilities furnishing these services realize that they are in duty bound to provide service for these new homes. * * * For every new home that is built, will be required the expenditure of at least $700 by the electric light and power, telephone, gas, and street railway companies in order that the new home may have gas, electric light and a telephone, and may be reached by a street car. Now, 700 times 1,000,000 is $700,000,000. Almost three quarters of a billion dollars in capital these four utilities must raise and expend in order to provide their respective services for these million new homes. And, each year they must provide $700 for each of the 350,000 houses that must be constructed to take care of the country's natural growth—a total of $245,000,000 or a quarter of a billion annually. This means we are confronted with the problem of raising at once one billion dollars for the furnishing of utility services to new homes and a possible half or three quarters of a billion more in order to furnish service to some of the millions of homes still without them; to say nothing of providing for new public schools, factories, apartment house, churches, theaters, etc., that are bound to be built and demand these services. It may be of interest to add, right here, that there are 6,500,000 families living on farms in this country. The lives of 2,000,000 of these have been made less burdensome by the introduction of electricity, 2,500,000 have a telephone, but these conveniences must yet be extended to the vast majority which remains unserved. Basing Indiana's population at 3,000,000 people, one can readily see that the electric light and power, telephone, gas and street railway companies of the state, without considering the requirements of its water, heating and other utilities, must spend at once 40 to 50 million dollars for the purpose of expanding their plants to meet the present and immediate future demands of the public. * * * Much needed expansion was arrested or deferred during the war, and today we find ourselves in a position of working our plants to capacity with a demand for our services, both present and future, which we cannot supply, unless we add to our facilities—unless we expand; all of which requires capital. Chairman Calder, of the United States Senate Committee on Reconstruction and Production, estimated at $2,000,000,000, the amount which all the utilities of the country will have to put into their business to pay for new construction, now required. He further states that the utilities must raise each year in the future through the sale of securities at least $700,000,000 to be spent in extending plants to serve the additional customers created by the country's natural increase in population. This figure represents $700 for every person added to the population.

Predicament of the Utilities.

Where is all this money coming from? The investing public must furnish it. In most cases, local capital is insufficient. Hence, the money markets of the country must be sought. The average investor will not consider placing his surplus money in any business that can not promise him the wages of capital! In other words, a fair return. * * * Community growth is dependent upon utility growth, and utility growth is dependent upon the investment of capital.

But investors of capital will not put their money into utility property if utilities are not allowed to earn as much as the legal rate of interest. How then are our communities to grow and expand if their great servants, the utilities, are unable to command the credit necessary to enable them to contract for capital to meet that growth and expansion? Why build one million homes to make up our shortage; why plan to build in addition 350,000 homes each year, if they are to be denied the things necessary to make them habitable? You may say, "Why do you utility men worry about all this? Why not let the whole thing come to a show down? Take care of what you already have and quit thinking of expansion until the public and regulatory bodies wake up." We might do this. But we're not going to until we are forced to. Why? First, because when that time does come and there has been a thorough awakening, it will be too late. In the meantime our service will have broken down. And we shall then get the blame. Our good will and going value will have been lost. Our investment will have been impaired, our property gradually confiscated. This is all a selfish reason. Secondly, because we're unselfish enough to want to serve properly and adequately our respective communities. We are not quitters. We are thinking always of the public interest. We are given a monopoly in our respective communities and with it goes a grave and legal responsibility to serve all comers, which responsibility we fully appreciate.

The Real Problem.

There's an esprit de corps among all utility men to develop their respective businesses to their fullest extent, to create a demand for their services and to supply that demand, in spite of the fact that there is no profit in the business—merely the possibility of earning a reasonable return. The utility operator is, also, a man of vision. He looks far into the future. He knows that his business is in its infancy. By past experience, he knows that electric light and power, gas, and telephone service are being used today for purposes that people never dreamed of a few years ago. And he knows that in the future these services will be used for other purposes undreamed of today by the average individual. And, because he knows, he wants to be prepared when the time comes. All he asks of the public is to be paid for these utility services at a rate that will pay his expense of operation including depreciation; pay his taxes and yield a reasonable return on the fair value of his property. * * * We are not asking for and could not expect a rate high enough that we may finance our expansion out of profits as some private businesses do, but merely enough to yield a return that will enable us to attract capital as we need it to finance our growth. No public utility under regulation could finance itself out of earnings if it wished, because for each dollar of additional annual gross revenue from the sale of public utility service it is necessary to provide additional facilities involving an investment of from $4.00 to $6.00 or more. Our real problem, therefore, is not one of actual physical expansion, even as tremendous as we know that expansion to be; it is one of financing this physical expansion. And it would not stagger us—this financial problem, this raising of vast sums of money—if we were granted rates that would allow us compensation enough to attract the needed capital.

The Solution Suggested.

How are we to solve the problem? Higher rates, if unpopular, will not solve it. The public must be with us, not against us. So there's the answer—the public. We must fully inform the public as to the facts. How are we going to do it? By just such meetings as this, more of them and more like them. We must employ every means at our disposal to get the facts to the public. When given the facts, the public must be impressed with the proposition that it has an interest greater than the selfish interest of the few who would stop the utility development of a community to satisfy a political ambition or a personal grudge. The public must, in its own interest, divorce public utilities from politics. Public officials of all communities must cooperate with their utilities rather than assume an antagonistic attitude regardless of the truth and oblivious to justice. We must resort to the advertising columns of the newspapers to tell our story. And, on the other hand, the newspapers themselves, through their editorial and news columns, can be and should be of great assistance. They could, if they but would, be of real service to the public in seeing that the public has the truth, especially when a difference arises between the utility and its customers: What a force for good a newspaper can be if it ascertains the truth and gives it to the public, regardless of whether or not it is tasteful to its readers at the time. * * * If we do all of this, and more, we may hope to receive at the hands of the Public Service Commission, or the regulatory body corresponding thereto, rates that will enable us to earn enough to attract that capital necessary to finance our growth and expansion, so essential to the welfare and growth of the community. We know that public sentiment must be with us. When it is, Public Service Commissions will be popular. * * * Given the facts, the public will soon rebuke the demagogue, the professional agitator and the public official who would play politics at the expense of the utility because, knowing the facts and in the knowledge that the interests of the public and the utilities are mutual, it will realize that it is the public that always suffers the more in the end.

Looking Forward; Conclusions.

We are, all, looking confidentially forward to a new era of prosperity, possibly unexcelled in the country's history. How soon it may come, none can successfully prophesy, but all signs point to the fact that we are now standing on the threshold of a revival of business. The state or community that awakens to the vital necessity of its public utilities prospering and keeping pace with its progress and economic development, and which encourages the necessary expansion of those utilities by insisting that they get a square deal at the hands of the regulatory body, will be the first to enjoy returning prosperity. A state, community or city can never grow faster than her utilities, or extend further than they reach. The prosperity of a city or town, its alertness, its up-to-date methods, its progressiveness, in fact, its very character are reflected directly to the extent that they exist in its utilities. Likewise, show me a city with broken down, unhealthy and restricted utilities and I shall show you a city living in the backwoods of civilization with no parks, improved streets or alleys; with unkempt homes and unimproved public buildings; without civic pride and self respect, and withal a slip-shod, shiftless, dozing, indifferent population—a mighty poor and unattractive place to live and do business. * * * Your local community, in most cases, can not supply all the necessary capital required by your utilities for expansion. Therefore, the financial necessities of development carry us to foreign fields for money. This foreign capital must be forthcoming if the community is to grow and it will be forthcoming if the investor knows that the public of that

community is back of its utilities, that investments in its utilities will be respected and that the state regulatory body will grant rates that will allow for unforeseen emergencies as well as for current operating expenses and enable them to earn a reasonable return on the money invested. Otherwise, it will look for fields where it can expect such treatment.

Results of Proper Policies.

If your utilities prosper, your community will readily and rapidly respond to renewed prosperity and, in fact, prosper to a much greater degree than the utilities which make it possible. New industries will come in, old industries will expand, your population will increase by leaps and bounds, real estate will enhance in value, homes will be built, and work will be ready for all and more. Your utilities will anticipate all of this. Adequate facilities will have been provided in advance, for utility operators know they must keep ahead of community development in order to supply the demand for service when it comes. The street railway company will have provided more cars and new tracks and more power to operate them, which may mean new and larger buildings to house the additional equipment. Your gas company will have provided new or enlarged plants and holders, laid more and larger mains with all corresponding facilities. Your electric light and power company will have installed the necessary additional central station apparatus with possibly a new power house, extending its leads to accommodate the new business offered it. Your telephone company will have supplied new and more switchboard facilities and buildings, also enlarging its underground system and extending its cables and wires to all corners of the territory to be served. In addition to this, you may look for a better standard of service from all of these utilities. The result will be to place your community "on the map." People will flock to it. Capital will seek investment there. It will be known as progressive and safe; a good place in which to live and do business. So, you see, the Problem of Expansion of Public Utilities is mostly a financial one, and is so closely related to the interests of the citizen that it becomes the community's problem, as well as that of the utility.

France Proposes to Spend 1,675 Million Francs on 'Phones.

Complete financial and technical reorganization of the French telegraph, telephone and postal service is provided for in bills which have been submitted to the Council of Ministers, by M. Lafond, under-Secretary of State for the Post, Telegraph and Telephone Administration. The new bills provide for the creation of an entirely separate budget for the posts, telegraph and telephones, covering the revenues and expenditures at present distributed among different chapters of the general budget. Improvement and extension of the telephone lines also is contemplated, the estimated cost of new lines being 1,675 million francs. The principal features are:

1. The improvement of inter-urban communication by 400,000 kilometers of new circuits, a large proportion being high capacity cables, served by relays. Communication between all points on French territory thus will be easily obtainable, no matter to what extent traffic develops.

2. The installation of automatic telephones in ordinary city exchanges, the automatic system being proposed as a means of guaranteeing efficient service.

3. The installation of automatic exchange apparatus in rural districts in order to connect them permanently with inter-urban stations having a wider range.

Rates would be considerably reduced in order to attract new subscribers.

Recent Foreign Engineering Standards.

Among the engineering standards issued by foreign national standardizing bodies during 1921 are the following that will be of interest to telephone men:

British Engineering Standards Association—No. 139 Red Fir Wood Poles for Telegraph and Telephone Lines; No. 144 Creosote for the Preservation of Timber.

Canadian Engineering Standards Association—No. 3 Galvanized Telegraph and Telephone Wire.

Copies of these standards have been received by the American Engineering Standards Committee and can be furnished at a nominal cost or the copies on file may be consulted at the offices of the committee, 29 West 39th St., New York, City.

Vast Operations and Building Plans of New York Telephone Co.

The vast amount of construction work now underway by the New York Telephone Co. must continue for a number of years to care for the state's telephone demands, declared G. W. Whittemore, Valuation Engineer, testifying before the commission's inquiry into statewide telephone matters. "The company probably will have about $15,000,000 in new construction continually in progress during this period," he said. Many new central offices, particularly in New York City, will be put into operation within the next three years, to provide new telephone service.

F. H. Fuller, rate engineer, declared that his company was associated with 280 connecting companies in New York State, of which about twelve were controlled by the New York company.

The New York Telephone Co. has invested about $116,000,000 in the securities of other telephone companies as a part of the Bell telephone system. In 1920 and 1921, the New York company borrowed $58,500,000 from the American Telephone & Telegraph Co., at 6% interest when money rates on the open market were considerably higher. This money was used for new construction in the New York company's plant.

New P. B. X. Telephone System Installed at Illinois Baden.

C. A. Berthold, Manager Sulphur Lick Springs Hotel Co., of Wedron, Ill., known as the "Illinois Baden," has installed a Stromberg-Carlson No. 102 P. B. X. switchboard and sixty telephones. The hotel company recently completed a $150,000.00 addition with every modern convenience and twenty-seven different varieties of sulphur water, fresh water, and salt water baths.

Telephone Safe Investment Basis Says Authority

New York City.—A recent issue of the Banker's Magazine contains a lengthy and interesting article under the title, "How the Telephone is Furnishing a Safe Basis for Profitable Investment," written by D. F. Houston, former Secretary of the Treasury, and now President of the Bell Telephone Securities Company. The article is a thoughtful treatise on the value of well founded telephone investments.

The Commercial Engineer

Another Article on the Work of the Telephone Engineer—Tells How Engineering Methods May Be Applied to the Solution of Certain Problems of Commercial Administration

By R. V. Achatz

The interdependence of commercial and engineering policies in the telephone industry has been suggested in a preceding article. In few industries is the relation between these two policies so close. To design the plant economically, the engineer must know the commercial practices of the company in regard to rates and classes of service, and the effect of these practices upon the probable development of the plant. In turn, the management must have engineering data if it is necessary to know property values or the life and salvage value of plant for the purpose of computing depreciation allowances. Other instances might also be cited to show the extent to which each is dependent on the other. Telephone engineers are called upon to solve many problems that have a direct bearing on the commercial welfare of their companies and it is the purpose of this article to indicate some of these commercial problems and the application of engineering methods in their solution.

Commercial Study of Exchange Development.

Many large engineering structures such as bridges, buildings etc., are constructed only when a need, present or future, is observed. It is generally recognized that a considerable period of time is required to prepare plans, write specifications, let contracts, assemble the material and do the work of construction. No one expects the structure to be ready for service as soon as the need for it is known. In contrast to this practice, most staple articles of commerce are produced in quantity and stocks are built up in the warehouses of manufacturer, jobber and dealer in anticipation of the demand. It is expected that the delivery of the goods will be made as soon as the purchaser makes known his desire to buy. The telephone plant structure, like any large engineering structure, requires a considerable time after the decision to build is made before work can be completed. The service from the plant, however, like the staple article of merchandise must be available for immediate use when it is required. The customer will not be satisfied to wait until his particular portion of the plant is finished. In the earlier days of the telephone business when the lines were open wire, perhaps no unreasonable delay resulted from the necessity of stringing a new line after the contract for service was signed. With the grouping of many lines into cable and the placing of cables in conduit, however, it obviously became impossible to place each line as needed. In the design of the plant when cable was first used, the cables were made barely large enough to accommodate the open wire lines that were to be removed. The spare pairs were soon used up by growth and additional cables had to be erected. Sometimes several small cables were placed on the same pole line and where underground construction was used the subways became congested as each small cable required its own duct. The uneconomical nature of such construction was quickly observed and it was apparent that a larger proportion of spare facilities would have to be provided when new cable was installed. No fixed rule could be made as a smaller percentage was needed in areas in which the telephone development approached saturation than would be required in an area where growth might be expected by reason of new building or change in character of the use of existing buildings. An extensive engineering study of the proper amount and distribution of facilities became necessary. Such a study is ordinarily called a development study.

Details of the Development Study.

When this problem of making an extended study of facilities faced the engineer, he proceeded along characteristic lines. He prepared maps of the area to be surveyed and determined the number and distribution of the present subscribers. He then prepared to forecast the number of stations at the end of five, ten, fifteen or twenty years. He classified houses and business buildings and studied the probable telephone requirements of each class. He located the vacant property and predicted its probable use in the future, taking into account the directions in which residence and business sections were growing. From these data he was able to place alongside the figure of the number of present telephones in each block, his estimate of the number of each class that would be found at certain times in the future. He was not content unless his results could be checked by other methods, and so he compiled statistics of the population of the area for many years past and of the number of telephones at different times in the past. He derived figures for the rate of growth in population and for the number of stations per 100 population and compared these figures with other communities. From these data he was able to prepare an estimate of the total number of stations at the end of definite future periods and to make a comparison of the total number as derived from the detailed study of station distribution. When the two sets of figures checked within a reasonable degree, the result represented the best estimate that was humanly possible to make of the telephone station development of the future.

The Fundamental Plan Is Evolved.

Growing naturally out of the development study came the fundamental plan. A fundamental study of the layout or backbone of the distribution system is demanded by the commercial necessity of constructing the most economical plant. The first problem was the location of the central office. The engineer was familiar with the mathematical principle that might be applied to determine the point at which the central office must be located to

make the average length of line the minimum. This required the development in terms of lines rather than stations and so an investigation of the grouping of stations into lines was made. The location of the wire center, as it has come to be called, is relatively easy when communities are laid out along regular lines but further study is required when some of the avenues for distribution are closed by hills, water courses or other geographical conditions, or where the situation is complicated by streets running diagonal to the general directions. If the number of lines required more than one central office, the problem of the number and the division of the exchange area into office districts must be solved. After both present and ultimate wire centers were determined, came the problem of securing the location of the central office that would best meet the requirements. Sometimes it was found to be economical to locate slightly away from the wire center due to the difficulty or cost of securing property at just the right place. Then came the determination of the principal feeder routes and the determination of the conditions under which it was economical to install plant for the ultimate requirements or to install for certain periods in advance only.

The development study and fundamental plan, however carefully made, are subject to the errors which may come from future development of the community along unforseen lines. New industries may come and old ones move away, or close, and profoundly affect the character and population of the town in a manner that can not be foretold. The commercial engineer must check his development studies and fundamental plans from time to time to take into account factors that may enter from these causes, but even allowing for a considerable margin of error, the following of a well-thought-out plan will result in a much more economical plant than if the construction is done in a haphazard manner to meet the needs of the day.

As Regards Depreciation Allowance.

The earlier telephone plants were of relatively short lived construction and it soon became evident that a reserve had to be set aside to prevent impairing the investment as the plant came to the end of its life. When the management came to consider the provision of such a reserve, it did not have the information upon which to base its judgment of the amount that should be set aside annually. The engineer, when he was consulted in the matter, did not have the information either but he attacked the problem in his usual systematic fashion. He classified the different units of the plant into groups, having relatively the same life, and traced back records and other information to determine the probable life of each class. He checked his findings by his own judgment and the opinions of others. Having the life of each class of plant and the investment in each class, he computed a composite figure which represented his judgment of the amount that was required annually. In many respects this judgment was, and still is, tentative as long-lived classes of plant are still of too recent origin to permit accurate determination of their life. In spite of its tentative nature in many respects, the engineer's data and judgment in the matter still represents the best available basis for computing depreciation.

Bearing on Valuation and Rate Cases.

Many times, the book value of the telephone plant required supporting evidence in matters involving taxation, financing, sale, etc. In a large number of plants no records had been kept, or the records were so imperfect that the value could not be determined. The engineer had been making cost studies of plant construction and he was called upon to make a detailed inventory and to prepare an appraisal. His method of proceeding in this undertaking needs no description here, as it is fully covered in the series of articles by Mr. McKay now running in TELEPHONE ENGINEER. When regulation of public utilities by state commissions came into vogue, more importance became attached to the matter of physical valuation and extensive studies of the bases of valuation, prices of labor and material, overhead expenses, and depreciation. Since the engineer had such a large part in the preparation of the valuation, it naturally followed that he took a leading part in the presentation of the cases involving rates and he was compelled to make many collateral studies to determine operating expense, proper schedules of rates, etc. In fact, the services of the engineer are practically indispensible when a telephone company is involved in a rate case before a public service commission.

The Future of the Engineer.

The close contact of the engineer with the commercial side of the telephone industry seems to provide an exceptional opportunity for the engineer to step into executive positions. To cite a few recent instances, announcement of organization changes in two large companies included in one case the promotion of the chief engineer to be general manager and, in the other case, told of the election as president of a man who had been vice-president and general manager, to which position he came through the chief engineer's chair. In another story of the unification of two systems in a large city, it was related that the work of unification was carried on under the direction of the vice-president and general manager of the company, an engineer, and public relations during the unification were in charge of the vice-president, another engineer.

You Can't Expect City Service in the Country.

"On account of the extent of territory served and the limited number of patrons, a rural telephone cannot collect the same rates or render service of the same character as a utility in a more populous community," says Pennsylvania Public Service Commissioner John S. Rilling in holding that the service of the Mahoning Rural Telephone Co., operating in Carbon and Schuylkill counties, is not inadequate. It was claimed subscribers had to wait long periods before getting service. Mr. Rilling says the rates that would be required to render service in the territory comparable with service in a city would be so high as to be prohibitive.

Up the Ladder—Illinois Bell Rewards Many Executives

Chicago—Edgar S. Bloom has resigned as vice-president of the Illinois Bell, having recently been elected a vice-president of the American Telephone and Telegraph Co. The following were elected officers of the Illinois company: As chairman of the board, B. E. Sunny, for many years president of the company; as president, W. R. Abbott, formerly vice-president and general manager, F. O. Hale, former chief engineer of the company. Mr. Abbott announced that G. W. McRae had been appointed chief engineer, and that R. W. Bang, formerly assistant to the vice-president, had been made assistant to the president.

Spring Construction Reports

Plans for the Season, as Turned in by Various Telephone Companies—Indications Point to a Busy Year—Additions to this List are Invited For Our Next Edition

This number of TELEPHONE ENGINEER will reach its readers just as a start is being made for the construction work that will be done during 1922. It is fitting, therefore, that this should be designated as our "Spring Construction Number." Some of our subscribers have sent reports of their plans for the season and part of these are published below. Prediction, made in the editorial columns of our February number that 1922 would be a year of much activity, are borne out by the reports that reach this office. The remarkable showing of the Bell System in 1921 and the large programmes of plant extension that are being carried out by that group of companies indicates the fundamental soundness of the telephone business. Difficulty of financing is the only reason that can be advanced against a policy of bringing telephone plants back to normal in 1922. The experience of the Bell companies in 1921 should convince others that financing is possible and so the last argument is removed. Telephone companies suffer least of all business during depression and are the first to recover when business strikes the up-grade. Telephone companies should lead the way in the return to prosperity. If they make extensions, materials must be purchased and manufacturers will find improved business. Labor is employed and more money is placed in circulation locally as practically all the wages of labor are spent in the local community. Activities increase in every line and conditions are soon on the mend. Let us get into the swing and help along. Plan construction now if it has not been done. Contract for materials and hire labor. If this is done, the telephone industry will be one of the earliest and most important contributors to the general revival of business. What some companies are doing is shown by the following reports:

Bear Valley, Cal., Planning New Phone System.

Victorville, Cal.—B. T. Ergenbright, of the Bear Valley Utility Co., is engaged in preliminary work on the new telephone system to serve Bear Valley. It is planned to connect with Interstate Telephone Co. lines to San Bernardino.

Illinois Bell to Do $18,500,000 Of New Construction.

The expenditure of $18,500,000 for new construction is planned by Illinois Bell Telephone Co., for 1922. In 1921, $15,645,000 was spent in Illinois, 35,100 telephones and equipment being installed, bringing the total of telephones owned by the company to 857,875.

Ree Heights Company Formed In South Dakota.

Pierre, S. D.—Articles of incorporation have been filed by the Ree Heights Telephone Co.; capital stock $7,500. Incorporators are H. Grady, C. W. Gardner, C. V. Gardner, Bessie M. Paine and Roger H. Paine.

$1,500,000 to Be Spent On Canadian Border Phones.

Windsor, Ont., Can.—According to F. W. Dewar, manager of the Windsor branch of the Bell Telephone Co. of Canada, this company must spend $1,500,000 to meet the telephone needs of the border municipalities.

New Company Organized at Fort Ransom, N. D.

Fort Ransom, N. D.—With capital stock of $10,000 the Fort Ransom Rural Telephone Co. has been incorporated by A. K. Rufsvold, Karl Johnson, Peter Gyldenvand, and others.

Milledgeville (Ill.) Mutual Telephone Co., H. L. Ehni General Manager, contemplates considerable underground work this season.

Morrison's Cove Telephone Co., Waterside, Pa., by J. M. Woodcock, reports that it will have a lot of cable work this year.

The Palmyra, (Mo.) Telephone Co., F. T. Staton Manager, will equip its magneto board with common battery clear-out signals.

The Steininger Telephone Co., Parker, S. D., will need a car of cedar poles and a quantity of dry cells.

The Mississippi Valley Telephone Co. of Sigourney, Ia., reports some cable work and considerable rebuilding planned for this summer.

The Two States Telephone Co., of Texarkana, Ark., Herrick Johnson Manager, has an extensive rebuilding and construction programme arranged for the plant at Greenville, Tex. Considerable minor work will be done on the Clarksville and Annona, (Tex.) plants and quite a lot of cable additions will be made to relieve congestion at Jacksonville, Tex. Minor additions and routine replacements are planned for Texarkana and the company's other exchanges.

The Goodland (Kans.) Telephone Co. will do considerable cable work this season and will be in the market for cable material by May 1. Address I. E. Robinson.

C. P. McCluer, General Manager of the Carolina Telephone & Telegraph Co., Tarboro, N. C., writes that they change to automatic apparatus at four of their exchanges this season; that they will add to their cable and central office equipment, as well as to their toll plant; and that they will be in the market for pole hardware, cable, strand, etc., at once.

W. D. Gay, secretary and general manager of the Commonwealth Telephone Co., Center Moreland, Pa., reports quite an extensive programme mapped out for 1922. At Dallas, Pa., about three and one-half miles of new cable and a four-position magneto multiple board will be installed. At Clark's Summit a complete new cable system will be put in for that place and Clark's Green, and a new three-position switchboard installed. Additional toll lines also will be erected between the company's own points and to connect with the Bell company at Wilkes-Barre and Scranton.

The Coast Telephone Co. of Port Lavaca, Tex., by H. C. Innis, manager, reports considerable work planned for this year on the rebuilding of toll lines and exchanges. They are in the market for No. 12 N. B. S. hard drawn copper, creosoted poles and lead cable.

The Pawnee Telephone Co., of Pawnee City, Nebr., G. E. Becker, secretary, will place about 3,000 feet of underground conduit and manholes and is in the market for immediate shipment of 3,000 feet of 3½ in. fibre conduit, about 500 feet of 400-pr cable and some manhole covers.

C. C. Chadwick, of the Hedrick, (Ia.) Telephone Co., reports that general repair work will be done by them this year.

The Illinois Telephone Co., of Jacksonville, Ill., J. H. Dial, General Manager, will, among other work for 1922, rebuild Carrollton, a magneto plant of 1,580 stations.

At Ardmore, Okla., the Southwestern Bell Telephone Co., Floyd Clark, district manager, is about to complete $100,000 worth of improvements, including the laying of conduits, construction of additional poles, new cable lines, and like work.

The Chesapeake & Potomac Telephone Co. plans the expenditure of $400,000 on improvements to plant and lines at Huntington, W. Va.

Two additions to outside telephone plant in Oklahoma City, Okla., to cost $32,000, will be made immediately, says R. J. Benzel, general manager of the Southwestern Bell Telephone Co. This enlargement, necessitated by the city's rapid growth, supplements a $70,000 construction job now under way in the Capitol Hill district.

The Crescent Telephone Co. of Port Byron, Ill., wants a franchise to extend its system into East Moline and operate there.

The Southwestern Bell Telephone Co. at Port Arthur, Tex., announces that material has been ordered for telephone systems at Nederland and Port Meches to connect up with the Port Arthur system.

The Tecumseh (Mich.) Telephone Co. has moved into a fine new home.

The Orangeville (Pa.) Rural Telephone Co.. has been incorporated with $10,000 capital stock by C. W. Hess.

The Pure Oil Co., of Columbus, O., is building a telephone and telegraph line from Nexia to Houston, Tex.

H. L. Gary Elected Director of Dawes Chicago Bank.

Chicago, Ill.—H. L. Gary of Kansas City, prominent in the telephone industry through his association with the Gary interests organized by his father, and vice president and treasurer of the Automatic Electric Co., has been elected a director in the Central Trust Co. of Illinois. This is the bank headed by Charles G. Dawes, the budget chief, and director of A. E. F. purchases.

The Bell's Annual Report

The consolidated Bell System income statement, which represents the business of the American Telephone and Telegraph Co. and its associated companies for the year ending Dec. 31, 1921, shows total operating revenues of $497,088,233, an increase of $47,646,118 over the previous year. The total operating expenses were $363,687,283, an increase of $16,867.666. Taxes amounted to $34,512,479, an increase of $6,671,145. There was paid $36,773,998 in interest and $47,848,394 in dividends, leaving a balance for surplus of $19,576,289. The report shows that the American Telephone and Telegraph Co. after meeting all operating charges and making adequate provision for depreciation and obsolescence, and for Federal and other taxes had available for interest and dividends $73,526,900.81. The interest charges were $19,524,197.09, an increase of $658,508.65 over similar charges for 1920, and dividends paid to stockholders at the rate of $8.00 per share per year for the first quarter and $9.00 per share per year for the last three-quarters of 1921 amounted to $42,674,403.00. Of the resulting balance, there was appropriated for contingencies $3,000,000, and the remainder ($8,328,300.72) was carried to the Surplus Account. In the American Telephone and Telegraph Co. the number of shareholders of record on December 31, 1921 was 186,342, an increase of 46,894 during the year. The average number of shares held was 29 and there were more women shareholders than men. Of the total number of shareholders, approximately 25,700 are employees of the Bell System.

Stock Enjoys Maximum Distribution.

Of all American corporations this company is first in the number of holders of its stock and has the widest distribution of ownership. The funds supplied by these investors have been used for the building and extension of telephone plants in every section of the United States. The report shows that the value of the property of the Bell System Companies is much in excess of the book figures and that the 5 per cent earned last year on the book cost of their plant enabled the American Telephone and Telegraph Company, due to the conservative financial structure of the System, to show 11.1 per cent earnings on its outstanding capital stock. Among important matters covered in the report are the organization of the Bell Telephone Securities Co. for interesting telephone subscribers and others financially in the System; the employees' stock purchase plan in which over 100,000 employees are interested; the development of the loud speaking telephone system which, by means of the long distance lines, carried the Armistice Day exercises to thousands across the continent; the opening of the telephone cable to Cuba; and the development in radio telephony for public usefulness.

Enormous Expansion of Telephone Industry.

During the past ten years, the investment in plant and equipment of the Bell System devoted to public service is shown to have increased 150 per cent. The expansion of the telephone business in the United States has been enormously greater than the growth of population or general business. In twenty years the population has increased 45 per cent while the number of telephones has increased about 900 per cent. At the end of 1921 there were over 13,380,000 owned and connected stations in the Bell System, two-thirds of all the telephones in the world. Any one of these telephones may be connected with any other telephone in the Bell System. During 1921, alone, the net gain in owned and connected telephones was 778,284. American standards of service and equipment and the facts in respect to telephone plant and station development afford substantial proof that the telephone service in the United States is the best and cheapest in the world.

Makes Good As Press Agent in Stock Selling Drive.

Shenandoah, Pa.—John F. Stanton, local manager of the Bell Telephone Co. has shown what can be done in making a stock selling campaign interesting news. In a recent issue of a Shenandoah newspaper Mr. Stanton's subscriber ownership stock selling campaign won a full column of free publicity of the most effective character.

Valuation in Rate Making

Chapter II

By Charles W. McKay

APPRAISAL TERMS.

A clear understanding of the various terms used in telephone appraisal work is most essential—especially in a treatise of this nature. One of the prime objects of these articles is to afford practical aid to telephone executives in the solution of their own valuation problems and, naturally, little can be accomplished in this direction unless the reader is thoroughly conversant with the terminology of the Science of Valuation and Rate-making. Hence, if the first part of this installment seems a little "dry"—make the best of it and try to gain a clear understanding of this important fundamental step in valuation work. Such an understanding will be of very real assistance in your perusal of the subsequent installments and will doubtless serve you in good stead, at some future date, when you are called upon to discuss appraisal matters in conference; before a Commission, or in Court.

The writer is emphasing these suggestions, at the risk of seeming verbose—for the simple reason that he has heard so many so-called "experts" make frequent misuse of even such fundamental terms as "cost" and "value." However, rather than to risk confusing the reader by presenting too many definitions at the beginning of our study of valuation work fundamental terms, only, will be presented in this installment and other, and less important terms, which will be met with from time to time as the subject is developed will be defined on the occasion of their first use. If any questions arise in the reader's mind regarding any of the definitions presented herewith, do not hesitate to write for additional information—care of the Telephone Engineer. However, it may be said that all of the definitions presented in this installment are generally accepted by both the engineering and legal professions.

Utility. In view of the fact that telephone companies are usually classified as "utility" companies—in contra-distinction to "industrial" companies—it may be well to start our glossary of appraisal terms with a definition of the word "utility." The Standard Dictionary defines utility as "the quality, character or state of being useful or serviceable; fitness to supply the natural needs of man; that serviceableness which is the basis of the value of a thing."

The phrases "character or state of being useful or serviceable" and "that serviceableness which is the basis of the value of a thing" both suggest the real meaning of the word "utility" as applied to telephone companies. These companies dispense *service* and, especially in our present consideration of the word, we are vitally interested in "that serviceableness which is the basis of the *value* of a thing."

The group of companies which make a business of furnishing "service"—rather than such tangible commodities as groceries, clothing, etc.,—are naturally known as "public service" or "public utility" companies.

Property. A most important definition, from the standpoint of the student of rate and valuation matters, is that of the word "property." It is "property" which we are called upon to appraise in our efforts to determine fair value for rate-making, or other, purposes.

Property has been well defined as the "legal right to the possession, use, enjoyment and disposal of a thing." From our present standpoint—that of the evaluation public utility properties—property may be said to consist of two essential elements,—physical property and non-physical property.

The physical property, as the term suggests, consists of that portion of a telephone company's assets which may actually be counted and inventoried—in other words, the land, buildings, poles, wires, cables, subscriber's instruments, switch-boards, etc.

The non-physical property includes many very real property elements which, by reason of their very nature, cannot be catalogued or inventoried. These elements of property are—franchises values, going-concern values, the value of good-will (if any), the expenditures for financing, etc. etc.

The non-physical property is frequently referred to as the "intangible property." In the writer's opinion the use of the word "intangible" is most unfortunate—in connection with valuation and rate problems. The non-physical property represents a very real element of total property value—one that is no less important, and in some cases perhaps even more important, than the value of the strictly physical property. It has been the writer's experience that the word "intangible" has a very misleading and undesirable effect upon Public Service Commissioners and Courts. The word intangible suggests something elusive and unreal. Anyone who has had experience in presenting telephone rate cases knows that it is hard enough to "prove-in" the elements of non-physical value—without creating an unfavorable impression at the outset by calling them by a name that instinctively arouses antagonism. It is therefore suggested that the reader, in presenting his own rate case, refrain entirely from the use of the word of intangible and group such items as going-value, cost of financing, cost of franchises, etc. under the general caption "non-physical property."

Value. Undoubtedly the two words most frequently misused—even by those supposedly well versed in appraisal matters—are "value" and "cost." These terms are frequently used synonymously. They are not synonyms and one should be very careful as to their use, especially in rate case work, if one would avoid the numerous pitfalls prepared by opposing attorneys.

There is an excellent book entitled "Principles of Economics" by Professor Edwin R. A. Seligman which presents an authoritative treatment of the subjects of cost and value. "Value," says Professor Seligman, "is the Latin term corresponding to the Saxon 'worth.' The fundamental idea which underlies worth is capacity to satisfy want. If we need

a nail and find a broken one, we say it is worth nothing—that it is valueless, or not valuable, for our purpose. Value or worth thus implies usefulness or utility. As a preliminary definition, then, we may say that the value of a thing is the expression of our estimate of its utility, meaning by utility its capacity to satisfy human wants. Value has a meaning only when attached to a definite quantity to an article. The value of iron means nothing: the value of a ton of iron means something."

From the ordinary commercial standpoint, value must, of a necessity, be gauged largely in terms of supply and demand. If there is a large demand for an article, and the supply is relatively small, the value will be high. Commercial value may be defined as "the amount which can be obtained for the object under consideration in an open market under normal conditions, if offered for sale or exchange."

From the standpoint of telephone rate-making, however, value may have quite a different meaning from that suggested in the foregoing definition.

The whole object of appraisement, in connection with rate cases, is to determine fair property values for the purpose of establishing adequate service rates. For obvious reasons, value for rate-making may be quite a different thing from value measured in terms of supply and demand, barter or sale. Value for rate purposes may, in some instances, be more—or it may be less than value when considered from the standpoint of ordinary commercial usage.

To illustrate this point let us consider the case to two competitive telephone companies serving the same community. In many instances the smaller, and less successful, company has a "nuisance value" to its competitor—or to any other telephone company wishing to invade the territory in question—far above the actual fair value of the property—even considering the attached business. Obviously, the commercial method of determining value cannot, in this case, be used as a basis for gauging rate-base value. The property doubtless has a very real value to its owners—due to the fact that it is desired by others but the owners could not expect, nor would they attempt, to ask, a utility commission to grant service rates based upon such values.

The Pacific Telephone & Telegraph Company recognized this fact in its famous California, Oregon and Washington rate cases—some years ago. The attorneys for the company made it quite clear that they considered rate-base value an entirely different thing from the true fair value of the properties involved. In applying to the commission for increased rates they attempted only to set up a fair rate-base value—but always with the reservation that the properties in question might be worth far more to their owners.

In discussing the subject of fair value for rate purposes the Wisconsin Railroad Commission has made the following statement—which would seem to reflect the general attitude of both commissions and courts with respect rate-base value:—

"The three elements of greatest importance in fixing the value of such plants (telephone plants) are: the original cost, the cost of reproducing the plant, and the present, (or depreciated) value."

In the case of City of Columbus et al. v. Southern Bell Telephone and Telegraph Company the Railroad Commission of Georgia permitted a far more liberal interpretation of fair value than is usually conceded by public service commissions. In fact the Georgia commission's interpretation of fair value would seem to lean toward commercial rather than public utility usage. In other words, in this case, the Commission conceded that the amount "a willing buyer and a willing vendor exercising reasonable judgment," agree upon should be entitled to serious consideration in the final determination of fair value.

This case is so unusual, from the public utility commission standpoint, that it will be well worth while for the reader to pause for a moment and study the accompanying diagram (Fig. 1) reproduced from the evidence presented in the afore-mentioned case. The diagram as presented in Fig. 1, however, has been entirely reconstructed—to facilitate a clear understanding by the reader.

Cost. Again quoting Professor Seligman—"the word 'cost' is used in a variety of senses. To the consumer, 'cost' means 'price.' If a thing cost a dollar, he means that the price is a dollar. To the employer cost means total cash outlay expended in production. Here the cost is less than the price, the difference between cost and price being profit;

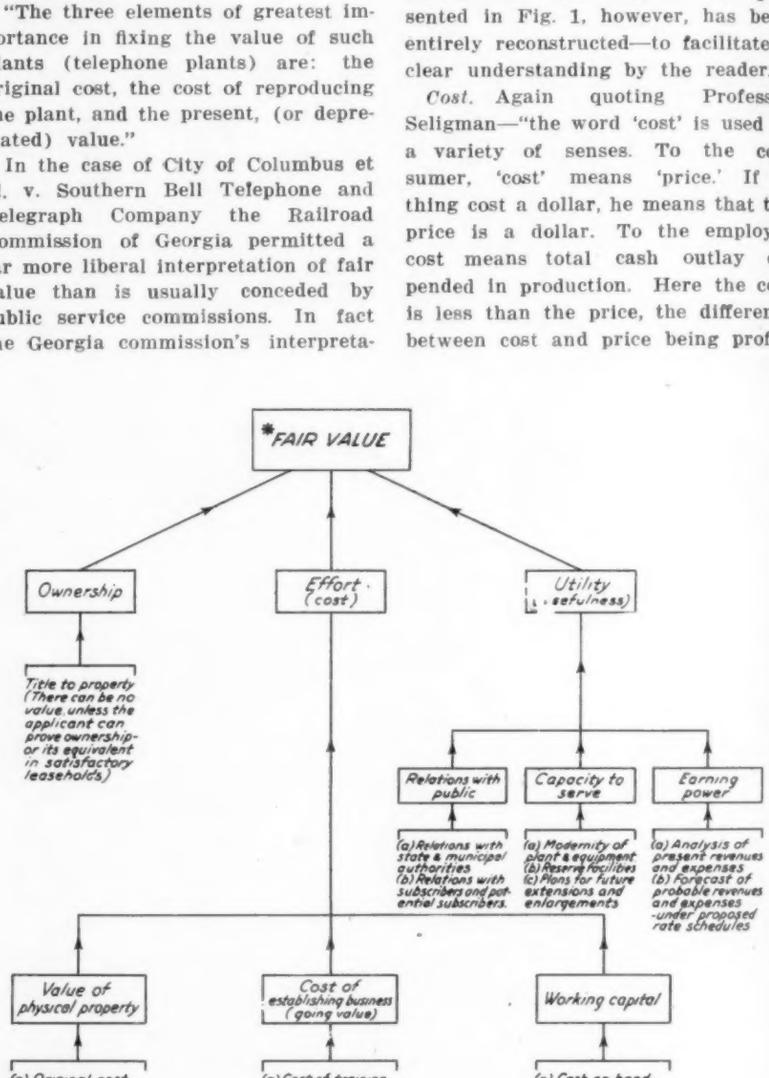

*FAIR VALUE
Ownership
Effort (cost)
Utility (usefulness)
Title to property (There can be no value unless the applicant can prove ownership or its equivalent in satisfactory leaseholds)
Relations with public
Capacity to serve
Earning power
(a) Relations with state & municipal authorities (b) Relations with subscribers and potential subscribers.
(a) Modernity of plant & equipment (b) Reserve facilities (c) Plans for future extensions and enlargements
(a) Analysis of present revenues and expenses (b) Forecast of probable revenues and expenses under proposed rate schedules
Value of physical property
Cost of establishing business (going value)
Working capital
(a) Original cost (b) Reproduction cost (c) Cost less depreciation (present value)
(a) Cost of training operating and other working forces (b) Cost of securing subscribers
(a) Cash on hand—money necessary for operating the business (b) Supplies—value of reserve stock of cable, wire, instruments, etc. (usually included with physical property)

Figure 1
Graphical presentation of the elements to be considered in determining fair value—(based upon the chart presented in the Columbus, Georgia case.)

* "By a consideration of these and such other relevant facts as may exist, a willing buyer and a willing vendor, exercising a reasonable judgment, are able to determine what the former would pay and the latter accept for the property in a fair transfer. This establishes the money value of the property."

a machine may cost the builder $10.00, he may sell it for $12.00."

For our present purpose we may define cost as the actual price paid for an article—plus such expenditures for labor and incidentals as may be involved in actually installing the article in question as a part of the working telephone plant.

In telephone parlance there are two kinds of cost—"original cost" and "reproduction cost." Again quoting the Wisconsin Railroad Commission in the famous Manitowoc Water Company case:—

"In determining the value of the physical property of a utility, several elements must be taken into consideration—the original cost; cost of reproduction and the present value. As to which of these elements shall be given the greatest consideration must be dependent upon the circumstances in each case and must also depend upon the purpose for which the valuation is made."

"Original cost" sometimes plays a very important part in public utility appraisal work. As the term suggests, the original cost of an item of telephone plant is the actual amount, or amounts, expended for material and labor for the original installation of the item—as shown by the company's books and records.

Unfortunately, for the advocates of the original method of public utility appraisement, actual installation and labor costs are frequently very difficult to determine—especially in the case of the older companies. For this reason, as will be shown in a subsequent instalment of this series, it has become necessary to evolve another method of public utility appraisement—known as the "Reproduction Cost Method." The definition of reproduction cost is almost self-evident from the term itself. Mr. Henry Floy, a pioneer writer on public utility appraisement, says: "These terms (cost to replace new, reproduction cost, replacement cost, and cost of reproduction) so much in evidence nowadays and recognized by the courts, refer to an assumed value based on the estimated cost of reproducing the property new on the basis prices current at the time of estimate, —prices that fluctuate considerable are averaged for five years preceding the date of appraisal,—and is made up to include everything that can be inventoried regardless of original cost, age, service value, or present condition affected by depreciation.

"Of course, a defect in the reproduction cost theory is that a utility cannot buy its materials, labor, etc. at average figures, but must make its expenditures when times and conditions or ordinances may require, often during periods of prosperity which, consequently, means during periods of inflated prices."

To close this preliminary discussion of the subject of cost let us pause for a moment and consider briefly a comparative illustration of appraisement by the original cost and reproduction cost methods. To simplify the illustration assume that the value (undepreciated) for a single 35′—6″ pole is in question.

At the suggestion of the Commission an effort is made to determine the original cost. The original cost of the pole, unset, may perhaps be found—though it is doubtful. Assume the cost is found to be $7.00.

When it comes to determining the labor costs—carting, unloading, roofing, digging and setting—the real difficulties are encountered. From a practical standpoint it is, of course, well-nigh impossible to allocate these costs for one individual pole. Theoretically—for the sake of our illustration—we may assume that these labor costs can be traced and are found to be approximately $3.00. Thus, the total original cost of the pole will be $10.00.

Now it may be that the commission —not satisfied with the evidence as to original cost—desires an estimate of the reproduction cost.

Referring to our definition of reproduction cost—we must determine "an assumed value based on the estimated cost of reproducing the property new on the basis of prices current at the time of the estimate—prices that fluctuate considerably being averaged for five years preceding the date of appraisal."

Now we can proceed in a truly workman-like manner—assembling all pertinent data, carefully analyzing this data and finally using it as a basis for determining a sane and provable property value.

Returning to our illustration—the material cost of the 35′–6″ pole would be determined by reviewing invoices of quantity purchases of similar poles for a period of at least five years before the appraisal date. A "weighted" average material cost would result—let us say—of $8.00.

The labor cost would be determined by estimating the number of poles that could be framed, carted, set, etc. per day—and applying "gang" prices derived by studying the company's pay-rolls for the five year period. If the resultant "unit" price came to $3.50, the total reproduction cost of the pole in place would be $11.50—or compared with the $10.00 original cost.

All of the elements of reproduction cost could be so assembled as to be susceptible to analysis—while the "original cost" would always be subject to the vagaries of accounting systems.

It is thought that the foregoing illustration will serve to clarify the definitions of original cost and reproduction cost.

Depreciation. One of the most important words in appraisal parlance is "depreciation." This is especially true from the standpoint of the various uses to which an appraisal is put in connection with rate-making.

The Standard Dictionary defines depreciation as "a lowering in worth." An excellent definition from the standpoint of public utility appraisement has been given by Dr. R. H. Whitten. Dr. Whitten says "Depreciation can be defined as the *lessened utility value* caused by physical deterioration or lack of adaption to function."

The latter definition,—Dr. Whitten's—makes a distinction between "physical deterioration" and "lack of adaption to function." Many authorities on depreciation make this distinction and refer to depreciation from physical causes as "Physical Depreciation." Depreciation due to other causes—such as lack of adaption to function, is usually termed "Functional Depreciation."

Physical depreciation, in turn, is subdivided into two classifications, as follows:—

(a) Depreciation due to wear and tear.

(b) Depreciation due to age or physical decay.

Depreciation from Wear and Tear. By far the most common cause of "lessening utility value" is that resultant from use. A telephone switchboard, for instance, that is used 24 hours a day year in and year out is bound to depreciate in value due to the very fact that it is in constant use. Such depreciation is known as "wear and tear" depreciation."

Physical Depreciation from Age. If this same switchboard, for some reason, is allowed to stand idle it will depreciate—regardless of the fact that it is not depreciating from wear or use. Mere age—with its resultant physical decay—will cause a lessening in utility value. Metal parts may corrode; wooden parts may warp or rot, and the insulation on wires and switchboard cables is bound to deteriorate with advancing age. Of course, depreciation from age or phy-

sical decay is not nearly so important a factor as is depreciation from wear and tear. Nevertheless, if someone offered you a twenty year old telephone switchboard that had never been used (even assuming, for purposes of illustration, that the board is of an up-to-date design) you would naturally feel that its value had depreciated and that its actual worth to you was less than that of an equivalent new board.

Functional depreciation, also, is subdivided into two classifications:—

(a) Depreciation due to inadequacy.

(b) Depreciation due to obsolescence.

Inadequacy Depreciation. Again referring to our illustration of the telephone switchboard—even if the board has suffered but little from wear, tear and physical decay—it may suffer marked depreciation in value due to the fact that it has become inadequate to successfully fill the requirements for which it was originally installed. For instance, it frequently happens that a comparatively new board has to be replaced because of unexpected growth in the demand for telephone service. The writer knew of a case of this kind that was not due to faulty engineering on the part of the operating company. The town served by the switchboard in question was comparatively small and not important from a manufacturing standpoint. Almost over night, a very large industrial company—for reasons best known to itself—decided to build a large plant in the town, thus causing an appreciable and very rapid increase in the population of the town and in the subscriber development.

Obsolescence Depreciation. One of the best definitions of obsolescence depreciation is that presented by Mr. Henry Floy in his "Valuation of Public Utility Properties."

"Obsolescence," says Mr. Floy, "means the depreciation of property through the development of something newer and either more economical or more of a fad. Like inadequacy, it may necessitate the abandonment of property long before it is worn out, and in many cases arises largely from demands of the public.

"What is obsolete in one place may not be affected by obsolescence in another. Note, for example, the recent introduction of P. A. Y. E. cars in the larger cities, or the use of open-bench cars in the Borough of the Bronx, where they are by many considered good practice, while at the same time they are considered obsolete for the Borough of Manhattan—all within New York City."

Possibly the true significance of obsolescence depreciation may be made clearer by again referring to our illustration of the telephone switchboard. Assume that the switchboard in question is of the magneto type and that it has not depreciated from wear, tear, physical decay or from inadequacy. Assume further that, although the board is sufficiently large to provide for a reasonable increase in subscriber development, there is a strong public sentiment in favor of the more up-to-date common battery form of service. It is well within the realm of possibility that the company in question could be forced by popular demand (especially when backed by the State Public Service Commission) to replace the obsolete board with the more up-to-date type. The depreciation, or lessening value, in this case would be entirely due to obsolescence.

Extraordinary Depreciation. Another classification of depreciation, that is well worth considering, is the depreciation resultant from unusual, or "extraordinary" causes. Especially in the middle West, and in some sections of the East, sleet storms play great havoc with telephone systems. The depreciation, or loss in value, resultant from a sleet storm would be known as "extraordinary depreciation."

A specific illustration of extraordinary depreciation came to the writer's attention less than a month ago. In a certain town a very large group of subscribers were entirely dependent for their service upon several large aerial feeder cables—encircling one end of a city block and traversing the alley, within the block, throughout its entire length. A fire broke out at one end of the block and destroyed a row of wooden outbuildings and fences bordening the alley. The telephone plant, within the block, was a complete loss—the poles being burned to the ground and the wires and cables damaged beyond repair. It cost the company several thousand dollars to replace the plant destroyed and the loss was of course entirely attributable to causes of "extraordinary depreciation."

This whole question of depreciation is most important and will be made the subject of subsequent chapter in this series.

Derivative Terms. In addition to the fundamental definitions, as presented in the foregoing paragraphs, there are a large number of so-called "derivative" appraisal terms, such as —"unit cost," "scrap value," "wearing value," "service value" etc. The meaning of most of these terms is obvious and rather than run the risk of making this chapter seem like a small dictionary the discussion of the derivative terms will be deferred until we have occasion to make actual use of them.

PRELIMINARY STEPS IN APPRAISAL WORK. In undertaking the actual work of the appraisement of the telephone property many intricate problems present themselves. A vast amount of detail is involved in the valuation of even the smallest telephone property and unless the preliminary steps are carefully thought out the appraiser is sure to come to grief before the work is completed.

Purpose of Appraisal. Naturally the first step that suggests itself is the consideration of the purpose for which the appraisal in question is to be used. If it be for rate purposes, certain specified forms will have to be strictly adhered to. On the other hand, if the appraisal is to be used for financial purposes, much of the detail may be eliminated—and many time-saving devices employed.

It may be well to review briefly the five principal uses of telephone appraisement. They are:—

1. Appraisals for use in rate-making.

2. Appraisals for use in connection with the sale or consolidation of telephone properties.

3. Appraisals for financial purposes.

4. Appraisals for use in connection with taxation.

5. Appraisals to serve as a basis for the establishment and maintenance of uniform systems of accounting.

Usually, appraisals are made for purposes of rate-making or financing. The form of appraisal for rate purposes is probably the most complicated and it is a comparatively simple matter to so mould a rate valuation that it may be used for all other purposes. In reviewing the preliminary steps, therefore, we may assume that the appraisal is to be presented before a Commission in connection with a rate application.

Commission Appraisal Instructions. Having determined the purpose of the appraisal, we are ready to start work in earnest: Every State Commission has certain rules and regulations which must be adhered to closely — if the valuation is to be accepted. Most Commissions issue definite instructions for the guidance of appraisers. These instructions are based upon the uniform systems of accounts. Accounting systems, as prescribed by the various state commissioners, vary somewhat—but all are based upon the system prescribed

by the Intertate Commerce Commission.

Interstate Commission Classifications. It may be well to pause for a moment and review, briefly, the classification of telephone companies as prescribed by the Interstate Commerce Commission. Companies are classified according to annual operating revenues, as follows:—

Class A.—Companies having average annual operating revenues exceeding $250,000.

Class B.—Companies having average annual operating revenues exceeding $50,000, but not more than $250,000.

Class C.—Companies having average annual operating revenues exceeding $10,000, but not more than $50,000.

Class D.—Companies having average annual operating revenues of $10,000, or less.

The Commission has issued detailed accounting instructions for Class A, B and C companies. Class D companies, in the main, utilize the same system of accounts as Class C companies.

The systems prescribed for Class A and B companies are naturally the more involved and, in general, they are used by the State Commissioner as a basis for their accounting systems and appraisal instructions.

This whole subject of Interstate and State Commission accounting is so important that it will be made the subject of a subsequent chapter in this series.

Other Preliminary Steps. One of the prime objects of this series is to render aid to the smaller telephone companies in preparing their own rate cases. Hence, if the writer—in phrasing his suggestions—seems dictorial remember that he is only trying to express himself clearly, laying due emphasis upon the points he knows—(from experience) are vitally important.

Returning, for a moment, to the subject of Commission requirements, be *sure* to find out exactly what your Commission desires before you make a single move toward starting the actual work of appointment.

Follow instructions to the minutest detail, even if you don't understand the underlying motives. Remember that your Commission's engineers have to review a great many cases. Their task would be a hopeless one unless they established certain standard forms of appraisement and insisted upon strict adherence to these forms. You may present an excellent appraisal that does not conform strictly to Commission regulations, and it may be "thrown out of court" bodily. Obviously, you would have only yourself to blame, but the loss in time and money would be appreciable.

After determining Commission requirements you are ready to consider the following steps in the order named:

1. Review of maps, records and other pertinent data.
2. Preparation of field and summary forms.
3. Selection and training of men for both field and office work.
4. Inventory taking.
5. Unit Cost Derivation.
6. Collateral or "overhead" costs.
7. Business or "going" values.

For obvious reasons these items can be discussed but briefly in the present chapter. It is the purpose of this chapter to present a resume of the fundamentals of appraisement. Each of the seven steps just enumerated will be discussed in detail in subsequent instalments.

Reviews of Maps and Records. For obvious reasons, it is desirable to have good maps for locating pole lines, showing aerial and underground cable routes, etc. If such maps are not available in your own files, they may usually be obtained from the office of the city, or county, engineers.

It is desirable to use large scale maps for locating pole lines while maps of smaller scale may be used to denote the aerial and underground cable plant.

For the rural plant the usual small scale county maps will be found to serve the purpose admirably.

In addition to the selection of maps for recording the outside field data, it is well to review carefully all records as to aerial and underground cable, conduit layouts, etc. Frequently much data of this nature is available which may be transferred to the working field maps—thus saving time in recording the field data.

Preparation of Forms. A careful review should be made of the various types and classifications of equipment existent in the plant—with a view to drafting the most suitable forms for recording the field data.

This whole subject will be discussed in detail in a subsequent chapter. For the present, suffice it to say that field and summary forms should be flexible enough to fulfill every need and still provide for the elimination of confusing detail.

Selection and Training of Appraisal Men. It is most important that good men shall be selected for the execution of both field and office work. Where the company is making its own appraisal, it is desirable to accomplish this end without interfering with routine work. In this connection, it may be said that in the ranks of most telephone companies many linemen, "trouble-shooters" and time clerks will be found who afford excellent material for field inventory work. The most important qualifications to bear in mind, of course, are familiarity with the telephone plant and the ability to record data legibly accurately and expeditiously.

The following plan is suggested for selecting men to do outside inventory work:—

Pick out an average pole line near the office—equipped with cross arms, open wire, and aerial cable. Make a careful inventory, yourself, of all equipment on this line. Afterwards, send each of the men you have in mind for inventory work to make an inventory of this pole line—without, of course, telling them that you already have a record of the equipment. Compare the results, as obtained by the applicants, with your own original inventory, and you will find that you have excellent data for determining the fitness of the men under consideration.

The foregoing plan was adopted, some years ago, by The Pacific Telephone & Telegraph Co., in its inventory of the plant, in, and adjoining, Los Angeles and Hollywood. Most of the applicants for appraisal work were company employes, and men who were supposed to be thoroughly conversant with outside telephone plant. The results were amazing. Many of the men found equipment which was not on the sample line, while others overlooked important details. The plan of selecting men, however, proved to be most satisfactory.

A plan similar to the foregoing may be used in connection with central office and subscribers station equipment.

Inventory Taking. With the men selected, and the maps and field forms completed, we are ready to start the actual work of inventory taking. This phase of the subject is so important that it will be made the topic of two subsequent chapters. For the present, suffice it to say, that the work should be planned, most carefully, in advance—with the thought of eliminating useless detail, guarding against duplications of inventory, and the obviating of as many errors as possible. The weather is a most important factor to be considered in connection with the inventory of the outside plant. The work should be so planned that outlying sections (where the roads are bad)

(Continued on page 37)

Conference on Dry Cells

Report of the Meeting Held at the U. S. Bureau of Standards to Determine Regulations for the Sizes, Performances, Tests, and Other Specifications Pertaining to Dry Batteries

A report has been issued by the U. S. Bureau of Standards giving the recommendation adopted on the Conference on Dry Cells, which met at the Bureau, Dec. 5th and 6th, 1921. This conference was called to consider the standardization of sizes and performance of dry cells, flashlight batteries, and assembled batteries containing the larger sizes of cells and radio batteries, and to revise the specifications which the Bureau of Standards prepared and issued in its Circular No. 79 about three years ago.

The conference considered first the different sizes of dry cells which are now being made. These included 17 different sizes. As a result of the discussion, six sizes were adopted as standard, one additional size being included provisionally. The members requested the Bureau of Standards to take up the question of tolerances in the dimensions for these cells and the Bureau, therefore, in submitting its report calls attention to the fact that the exact dimensions of the cells and batteries as given in the following tables are subject to revision. The Bureau invites criticisms of the dimensions and asks that the manufacturers furnish data for fixing the tolerances. The following sizes of dry cells were adopted as standard by the conference. These are shown in Table 1, as follows:

Designation	Diameter of zinc can	Height of zinc can	Height over all	Diameter over carton
	inches	inches	inches	inches
No. 6	2½	6	6½	2⅝
No. 4	1½	4	4⅜	1⅝
Flashlight	⅝	1⅞	2	.....
do	¾	2⅛*	2¼	.....
do	15/16	1 13/16	1⅞	.....
do	1¼	2¼	2⅜	.....
do	1¼	2⅞	3	.....

Table 1.—Provisionally adopted. Use for this cell decreasing. Probably will not be continued long as a standard size. Used in third battery of Table 2.

Specifications for Flashlight Cells.

Several other sizes of cells were considered of some importance but not sufficiently to be included in the standard list. These are the No. 8 cell 3½x8 inches for export; a flashlight cell $\frac{9}{16}$x1⅞ inches for small tubular flashlights; the cell 1x2⅞ inches commonly used in earphone batteries; and a flashlight cell 1¼x3½ inches which may become important in the future.

The conference next considered 30 different sizes and kinds of flashlight batteries and adopted 8 of these as standard sizes. These standard sizes are shown in Table 2 herewith.

Changes Made in Names for Tests.

The test which has been commonly referred to as the A. T. & T. test is to be known in the future as the "light intermittent service test." In the discussion of this test the fact was brought out that the resistance of the telephone circuit is more nearly 50 ohms than 20 ohms and that a 50-ohm test (as well as a 20 ohm test) is in use by the American Telephone & Telegraph Co. It was the opinion of the conference, however, that the characteristics of the cells are properly shown by the 20-ohm test which has been used in the past and that the 20-ohm test should be continued as standard, since the 50-ohm test requires too much time to complete.

(For Reference Only) Battery Type Numbers				Assembly	No. of Cells	Size of Cell		Size of Battery		
Eveready	Burgess	Bright Star	Kwiklite			Diam.	Height	Length or Height	Width or Diam.	Depth
						inches	inches	inches	inches	inches
750	422	5016	1203	Flat	2	⅝	1⅞	2¼	15/16	11/16
751	432	5116	1308	Flat	3	⅝	1⅞	2¼	15/16	11/16
708	532	0316	1309	Flat*	3	¾	2⅛	2⅝	27/16	13/16
791	122	9116	1203	Tubular	2	15/16	1 13/16	3¾	1	.....
.....	.....	.....	.....	Unit Cell	1	1¼	2¼	.....	.....	.....
790	222	9016	1202	Tubular	2	1¼	2¼	4 11/16	1 5/16	.....
705	232	0516	1301	Tubular	3	1¼	2¼	7	1 5/16	.....
734	332B	3416	1381	Box	3	1¼	2⅞	3	3⅞	1⅝

*Table 2. Provisionally adopted. Use decreasing. Probably will not be continued long as standard size. Contains cell, provisionally included in Table 1.

The conference next considered batteries containing 15 cells for radio use, and standardized two sizes of these batteries as shown in Table 3:

TABLE 3

Assembly	No. of Cells	Size of Cell		Dimensions of Battery		
		Diameter	Height	Length	Width	Height
		inches	inches	inches	inches	inches
Rectangular Box	15	⅝	1⅞	3⅝	2	2½
Rectangular Box	15	1¼	2¼	6⅝	4	3

The conference also considered batteries assembled from cells of the No. 6 size and selected from about 30 different sizes and arrangements the following as standard:

TABLE 4

Assembly	Voltage	Length	Width	Height
		inches	inches	inches
0000	6	10½	2¾	7½
00 D0	6	5¼	5⅛	7½
00000	7½	13¼	2¾	7½
000 00	7½	7⅞	5⅛	7½
000 000	9	7⅞	5⅛	7½
00	3	5⅛	2¾	7½

The matter of tests for dry cells and batteries was discussed at length and the following conclusions reached:

The ignition test is to be known

as the "heavy intermittent service test." The reasons for changing the name by which this test and the telephone test are designated were first that: the names "telephone" and "ignition" imply too limited an application of these tests, and, second, that the duration of the test is a more important factor than the current, intermittently discharged. The heavy service intermittent test was modified by specifying a cut-off voltage, rather than the impulse current which has previously been employed to define the end of the test. The cut-off voltage adopted was 0.85 volt per cell. The 10-ohm continuous test for large cells, the 2.75-ohm test for flashlight cells and the flashlight intermittent test were continued as in the past.

As a standard test for the radio batteries of 15 cells each, the conference adopted a continuous discharge through 5000 ohms to a cut-off voltage of 17 volts for the battery or 1.13 volts per cell.

To Investigate Short Circuit Test.

The conference considered the significance of the short-circuit current test and adopted a motion that this test should not be applied to telephone cells. The Bureau was asked to investigate further the significance of the short circuit current test. The conference instructed the Bureau (a) to obtain information from the manufacturers as to tolerances in the dimensions for each size of cell or battery, (b) to prepare specifications for delayed service tests of 3, 6, 9 and 12 months, (c) to revise the specifications which are contained in Circular 79 of the Bureau of Standards, and (d) to take up with the Earphone manufacturers the possibility of reaching an agreement on standard sizes of batteries for earphones.

In several cases the conference was unable to fix the required performance of certain sizes of cells on test and the matter is to be decided as a result of additional tests to be made on samples submitted to the Bureau of Standards by the manufacturers. Changes in the required performance of flashlight cells and batteries as recommended to the conference by the Bureau of Standards were adopted.

Several times during the discussion mention was made of the possibility of future conferences. No formal action was taken in this matter but the Bureau welcomes the suggestion, and will be glad to do its part in making future revisions and maintaining the effectiveness of the standardization.

AT CAMP BALDY.

Telephone Men 4,700 Ft. High; One Hour From Snow; Two From Ocean.

Aubrey Wardman was born in Canada in 1877. Like all successful business men who have given all reserves of strength to their business, he paid the usual penalty of a man who reaches the

A. Wardman and Wife.

magic age of 42. The pictures show Mr. Wardman before his illness and after he was allowed to get up. The baby shown in the picture was a borrowed one, for Mr. and Mrs. Wardman

It Left Him Thinner.

have grown children. Mr. Wardman has a beautiful summer home called Camp Baldy, 4,700 feet high, underneath "Old Baldy" mountain, and it is here that telephone men meet when they have problems to vex them. The

Gathered at the Rustic Bridge.

late Mr. Parker was there; also Frank Wright of Covina; Tom Gould, of Redondo; Jim Fanly of the Kellogg Co., and others.

At Camp "Baldy".

One hour from snow; two hours to old ocean. Such is life in California.

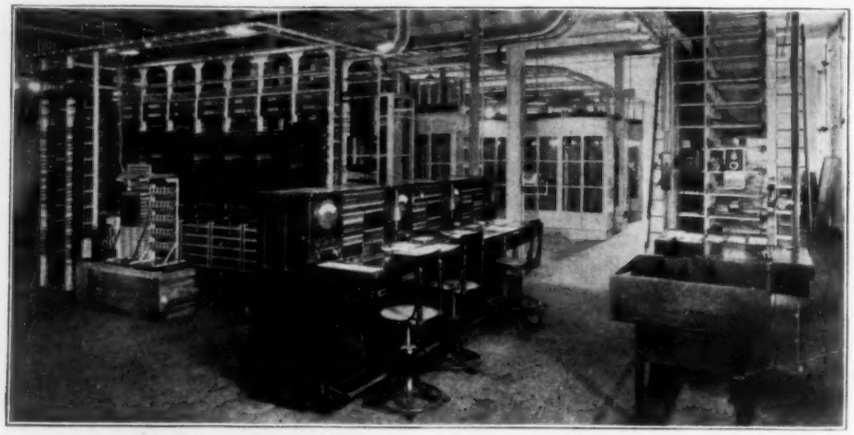
Service Connection Properly Included in a Telephone Rate Schedule.

In approving the application of the Bear River Valley Telephone Co. for permission to establish certain rates for the installation of telephones for new subscribers, the Utah Commission stated that the service connection charge was a charge imposed upon the patron when he originally applied for service or when a change was required, and that it was intended to cover the special expense made necessary by particular individuals and was designed to prevent discrimination against those who made no special demands and who used the service for a long period of time without change of location.

Automatic Phones at Miami

Florida Resort City Calls "Central" For the Last Time Jan. 28 When South Atlantic T. & T. Co. Cuts Over To Its New System

The Miami (Fla.) exchange of the South Atlantic Telephone and Telegraph Co. "went Automatic" at midnight, Sat., Jan. 28, 1922. Frank B. Shutts, president and F. W. Webster, general manager, were highly gratified with the success of the cut-over and with the performance of the equipment. The number of stations has an initial capacity of 4,200 lines, including individual and two-party flat rate, and individual message rate lines, and P. B. X trunks. Equipment is installed also for 200 pay-station lines. The official and emergency number code is as follows: Long Distance, 110; Information, 113; Repair Clerk, 114; Rural, 116; Wire Chief, 1117;



General View of the Miami Automatic Switch Room, showing main distribution frame at right, three position test desk in foreground and switchboard in rear.

served by the Miami telephone company has almost doubled in the past two years. Read how the business has grown: 1910, 300 phones; 1911, 410; 1912, 578; 1913, 683; 1914, 944; 1915, 1077; 1916, 1299; 1917, 1937; 1918, 2326; 1919, 2352; 1920, 3653; 1921, 4991; 1922, 6685. The program of the company during 1921 included, besides the Automatic switchboard, a new building, a new long distance switchboard, new underground subway with conduit, and many thousand feet of cable in existing subways and on poles.

The actual transfer of service was accomplished in less than thirty seconds and President Shutts made the first call over the new switchboard to his home. Early Monday, after the cut-over, General Manager Webster exchanged greetings with Messrs. F. T. Caldwell, chief engineer of the Cuban Telephone Co. at Havana; H. E. Hart, long distance superintendent of the same concern, and Frank Holmstrom, Jr., and H. P. Mahoney of Automatic Electric Co., who were in Havana at the time. A special circuit from Havana to Miami was held for 30 minutes.

The Miami Automatic switchboard

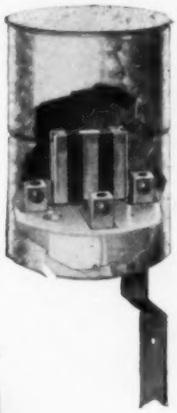
Zero Operator, 0; Official P. B. X., 9001. At the zero operator's desk are handled special service or other calls of a miscellaneous character, as well as calls to Cocoanut Grove and Miami Beach where manual switchboards are operated. Attempted calls to changed numbers or dead numbers are automatically routed to this operator. Four-party line residence service within the Miami city limits has been abolished, and about 1000 subscribers of this class changed to two-party service, with full selective ringing. This change called for about 400 additional lines. Some weeks prior to the cut-over, demonstration sets were installed at the company's office, subscribers were invited through advertisements in the local press and by letter to call and be shown the convenience and rapidity of Automatic service. In addition a corps of men made personal calls to offices and residences for purposes of demonstration. At an early date the company expects to announce a formal opening for the public. While the central office equipment is housed in a new building, the business office remains in its old location. As quickly as the old manual switchboard can be dismant'ed, the entire second floor will be remodeled to provide commodious offices. The new Miami equipment was manufactured by Automatic Electric Co., of Chicago, and installed under supervision of J. K. Barrington, chief installer. The testing and cutover were supervised by James Engh, Operating Engineer for the manufacturers. President Shutts says: "No city in the world can boast of anything better in the way of telephone equipment."

Handsome New Fireproof Building which Houses the Miami Automatic Switchboard.

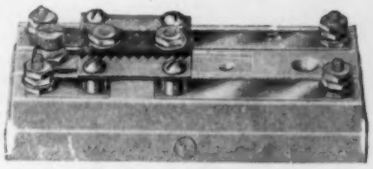
UNINTERRUPTED USE OF FARM TELEPHONES

(The Recognized Standard for Rural Protection)

No. 402-S
Out-door
Mounting



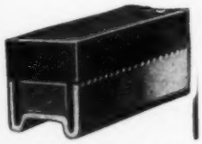
SELF-CLEANING
SAWTOOTH
AIRGAP
LIGHTING
ARRESTERS



No. 975-B
Indoor Mounting

NEVER GROUND
THE LINE

Equipped with



P495 Sawtooth
Discharge Blocks

NO DIRTY
CARBONS
TO CLEAN

Reliable Electric Company
3145 Carroll Ave., Chicago, Ill.

(Continued from page 33)

can be inventoried during clement weather—with the thought that "city plant" may usually be recorded under almost any weather conditions.

Unit Cost Derivation. The next step in telephone appraisal work involves the derivation of the unit costs. In other words, where one thousand exactly similar poles are found (say 35'—6") one unit cost may be derived, which can be applicable to the entire group. As previously suggested, records of pole, wire, cable and equipment costs should be reviewed for a period of at least five years antidating the date of appraisement. In a similar manner, labor costs will be reviewed for the purpose of building up the "gang" units. This subject also will be discussed, in detail, in a subsequent chapter.

Collateral or "Overhead" Costs. There are certain costs which are just as much a part of the total cost of the physical property as are the individual, material, and labor items,—but which, for obvious reasons, may not be included in the unit costs applied to the inventory. These costs are applied to the appraisal as a whole and include the following items:

1. Omissions from inventory and contingencies.
2. Warehouse and purchasing expense during construction.
3. Tools and tool expense during construction.
4. Interest during construction.
5. Taxes and insurance during construction.
6. Engineering and general supervision during construction.
7. General and legal expense during construction.

These items are usually referred to collectively as the "collateral," "indirect," or "overhead" costs.

For obvious reasons, the determination of the collateral costs forms a most important factor in the preparation of the completed appraisal. The items of collateral cost are usually subject to question by opposing counsel—and all of the evidence must be most carefully prepared. This subject will be discussed in detail in a subsequent installment.

"Business" or "Going" Values. The subject of business values is too intricate to permit of detailed discussion at this early stage of our study of telephone rate and valuation problems. It is a known fact, however, (and a fact generally conceded by courts and commissions) that every telephone business has a very real value—over and above the value of the purely physical property. This value is usually referred to as the "business" or "going concern" value. As previously suggested, an unfortunate precedent has been established for referring to business values as "intangible" values. They are *not* intangible—but form a very real part of the total rate-base value. As suggested, the use of the word intangible should be avoided in presenting a telephone rate case.

It is thought that the foregoing—albeit rather general—discussion of the Fundamentals of Telephone Appraisement will afford the reader a working basis for a clearer understanding of the ensuing subject matter. The next chapter will deal with the all important subject of Accounting Systems, and the correlation between systems of accounts and valuation-rate matters.

South Dakota Convention at Huron, April 25-26.

J. J. Bollinger, secretary of the South Dakota Telephone Association, informs us that their annual convention will be held at the Marvin Hughitt hotel, Huron, S. D., April 25–26.

New Bureau for Wisconsin

Annual Convention of Wisconsin State Telephone Association Plans Service to Help Members With Commission, Subscribers and Plants—Lively Meet

Milwaukee, Wis.—Within the next week or so a committee of Wisconsin State Telephone Association members will meet at Madison to act upon the organization of a service bureau, a proposed extension of the association's activities which was the outstanding development of the annual state meeting held at Milwaukee, February 14–16.

Concrete suggestions regarding the scope, operation, and financing of the bureau are to be presented at the committee meeting in accordance with instructions issued by the convention delegates.

Under the guidance of President Walter J. Gallon the sessions went through with zip and practical value that set a high water mark for the Badger state affairs.

"Normalcy" Is Now.

In his presidential address Mr. Gallon accepted the conditions of the present as "normalcy" in the telephone business. In his 20 years as a telephone man, he said, he was always wondering what was going to happen next, so the present state of affairs was not one to cause more than the usual number of sleepless hours. His comments on the relations between employer and employee, and between the public and the company epitomized the most practical thoughts on the subject. Mr. Gallon said: "The greatest problem before us at the present time is our relation to the public or in other words, the public's attitude toward us. It is gratifying to know a great effort is being made to meet that issue. I believe the greatest secret of success that can be attained along these lines is by getting our houses in order; by that I mean see that the employes have the right amiable feelings toward the employer. Happy employes, knowing that their employer has their interests at stake, will radiate that feeling to the patron with whom they come in contact."

Engineering the Future.

L. J. Fitzgerald, commercial engineer of the Wisconsin Telephone Co., presented an illustrated paper on "Commercial Surveys" which brought out the importance of engineering telephone business in order that every possible economy be effected. The purpose of commercial surveys in determining future demand for telephone service and for rates and service establishment was outlined, and a concise, though comprehensive outline of a commercial survey was presented in which the basic ideas responsible for Mr. Fitzgerald's own conspicuous success at this work, were revealed. A lively discussion followed the close of Mr. Fitzgerald's paper.

Safety Code Interests.

A discussion of the proposed Wisconsin electrical safety code was started by C. B. Hayden of the service department of the Wisconsin Railroad Commission, who told of the code, section by section, and said that its adoption will soon become compulsory, and result in minimizing danger to employees. Improvements in the code could be made, was the thought of F. H. Runkel of Portage, who referred specifically to crossing requirements. He recommended an intensive study of the proposed code to all Wisconsin telephone men.

Valuation; Underground Work.

Inadequacy and obsolesence enter into telephone company valuation more than in the valuation of any other property, according to W. A. Bauker of the American Appraisal Co., who read a paper on "Physical Valuations." Work of valuation, if properly arranged, is quickly accomplished, said Mr. Bauker.

A blackboard and chart talk on "Underground Construction for Small Exchanges" was made by J. M. Storkerson of the LaCrosse Telephone Co. Several managers in relating their experiences showed the feasibility of underground construction from both cost and maintenance angles. Typical instances were mentioned at Prairie du Chien, where cable was placed underground for about 17 blocks and the company there has always been glad that it was done. The underground was placed in 1915 at a cost of 18 cents per foot of fibre conduit in concrete, with manholes at $25. In Reedsburg in 1920 cable was placed underground at a cost of 30 and 31 cents per duct foot, including the manholes. On ordinary streets, Mr. Storkerson maintains, it is cheaper to construct underground than by the air route, and maintenance is lower. By using a cigar box he described building a manhole with concrete. The blackboard helped clear up details.

Co-ordination or Interference?

"Inductive Co-ordination," instead of inductive interference, Dr. W. J. Canada, electrical engineer of the National Electric Light Association stated to be the real subject for signal and supply systems. He said balance of facilities could only be obtained by national action. Dr. Canada's remarks from the viewpoint of the electrical companies began action in earnest on the Wisconsin front. F. H. Runkel showed what the telephone companies were doing as their part of harmony in properly constructed metallic lines. J. N. Cadby, of the Wisconsin Electrical Association, protested against damnation of electrical companies as a whole because of a foreman's exhibition of "ivory" on some particular job. He called the grounded telephone line obsolete and registered the proper companies' remonstrance against being held responsible for all costs. Dr. Canada remarked that the whole discussion had begun ten years too late for speedy settlement. Roy Wheeler, of the Wisconsin Telephone Co. stressed the telephone companies' priority in the field and mentioned the lowered factor of safety and more costly maintenance of telephone lines necessitated by the power companies' entry. He said telephone lines' influence on power service is not detrimental but the reverse did not

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Act on our suggestion. Place a trial order today. Become acquainted with French Quality. It means the first step in cutting your maintenance costs.

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NOTICE

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Full information will be furnished on request. Write for it.

French TELEPHONE BATTERIES

hold true. Tree grounds he mentioned as an important factor. H. A. Price, of Markesan, told of the happy results of teamwork with power company engineers in his territory. He cited an instance where metallic circuits were considered as the result of a power company's proposed entry into a community, and as the necessary higher rates were refused, the power company was prohibited from making its debut until protection was afforded the present telephone construction. His upholding of the grounded line received support from other speakers. C. B. Hayden of the commission said they were only two cases where that authority ruled against grounded lines, but added that the commission had no power until inductive trouble has been suffered.

President F. B. MacKinnon, of the United States Independent Telephone Association, in brief remarks, told of the national body's efforts to facilitate an early settlement of inductive interference matters.

Construction's Advance.

O. A. Blackwood, of Elkhorn, manager of the States Long Distance Telephone Co., in speaking on "Proper Methods of Construction," compared the methods of 24 years ago with those of today. He spoke of the ease of obtaining standardized specifications and the material vital to proper construction. Correct guying, with the anchors far enough away from the poles, he mentioned as an important item. Other ideas he presented, as aiding work, advocated protection of substations, soldering all line connections, substation and battery regular inspection, and specific instructions to troublemen.

Radio Gets Attention.

An outline of radio work was presented by P. J. Weirich, of Monro, Wis. He said a study of the radio laws of the U. S., obtainable from the Superintendent of Public Documents, Government Printing Office, Washington, at a cost of 15 cents (not stamps) was elemental. He introduced Professor E. B. Terry, of the University of Wisconsin, who told of that institution's radio broadcasting activities and the co-operative value of radio to telephone companies. His interesting blackboard talk explained radio principles to the telephone men. Professor Terry outlined radio value to wire companies as:

1; a connection between wire and radio to permit the talking to persons, trains or on ships.

2; doing away with the maintenance of very expensive wire lines such as over mountains, swamps, etc.

3; co-operation so the telephone companies can get information to their rural subscribers, such as news, market and weather reports, as all individuals will not have wireless receiving sets.

4; a possibility of the future is that radio may replace some of the longer hauls of overland wire lines.

How Business Grows.

The association's help to its members was described by Secretary John A. Pratt, who gave the importance of getting living rates as the foremost consideration of the association's members, and presented interesting comparative figures of 49 companies in 1915 and 1920. Secretary Pratt's proposal of a plan for financing a service bureau with a $10,000 starter met with unanimous approval. Companies are to be classified and finance the bureau accordingly This bureau is to make it easier, surer and less expensive for association members to deal with the commission and subscribers.

New Officers Elected.

The annual election of officers resulted as follows:

Arthur Taylor, Rhinelander, President.

H. A. Price, Markesan, vice president.

W. F. Goodrich, LaCrosse, treasurer.

J. A. Pratt, Madison, secretary.

H. A. Price and F. H. Runkel were elected to fill vacancies on the board of directors.

P. J. Weirich was named as the association's representative at the Washington radio conference.

Phone Earnings Continue Climb Says I. C. C. Report.

Washington, D. C.—Reports of telephone earnings of sixty-seven companies, as reported to the Interstate Commerce Commission, show operating revenue of $46,049,739, an increase of $3,765,996 over November, 1920, and a balance, after expenses, of $12,939,878, representing an increase of $3,521,866. For the eleven months operating revenue was shown at $493,219,190, an increase of $47,440,603, and the balance, after expenses, $135,098,051, or $31,631,272 more than the corresponding period of 1920. Operating income for the eleven months was $98,865,652, compared with $74,326,407 for the period of 1920.

Kast Quits As Minnesota's Secretary-Treasurer

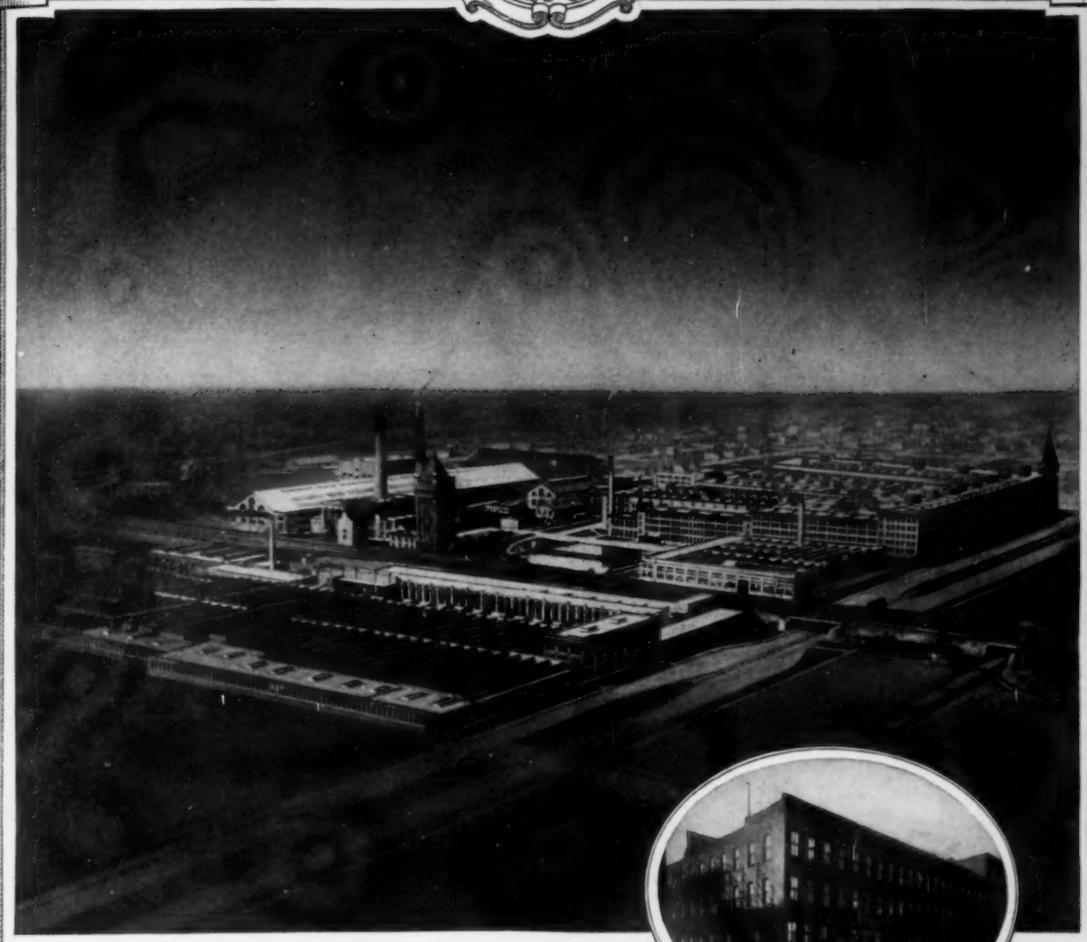
Minneapolis, Minn.—E. C. Kast, secretary-treasurer of the Minnesota Telephone Association, has resigned. His future plans have not been announced. Mr. Kast entered the telephone business 20 years ago with the Erie Telephone Co., an old Bell organization. In 1903 he became special agent at Minneapolis for the Tri-State Telephone and Telegraph Co., resigning from this company in 1915 to go with the Minnesota association. During his tenure of office he organized and supervised the operation of several successful small independent companies. J. C. Crowley, Jr., who succeeded Mr. Kast, started with the Chicago Telephone Co. in 1892 and two years later entered the service of the Western Telephone Construction Co., for which he helped build exchanges at Muskegon, Grand Rapids, and Alpena, Mich., and Eau Claire and Chippewa Falls, Wis. In 1898 he was made manager of the Eau Claire and Chippewa Falls exchanges and in 1899 went to Duluth, Minn., as superintendent of construction for the Zenith Telephone Co.. In 1901 he became associated with the Peoples Telephone Co., of Superior, Wis., as general manager, was elected also secretary and treasurer in 1912 and served until the consolidation with the Wisconsin Telephone Co. in 1921.

Dalton Waller, former manager of the Indiana Bell exchange at Bedford, Ind., now has charge of the Crawfordsville exchange, in place of F. D. Fee, who goes to Indianapolis as secretary of the employers' benefit fund.

B. M. Burrus, formerly manager for the Cumberland company at Ashland City, Tenn., is manager now of the company's Dickson exchange. At Ashland City, he has been succeeded by Mr. Harrison, of Sewanee.

Walter Thorgrimson, commercial engineer for the Lincoln (Nebr.) Telephone and Telegraph Co., has resigned to become assistant to the general commercial superintendent of the Northwestern Bell Telephone Co. with headquarters in Omaha. Mr. Thorgrimson has been with the Lincoln Telephone and Telegraph Co. since 1909. He is succeeded by Milton Barratt.

A. D. Welch, general commercial superintendent of the New York Telephone Co., tells the commission that the company's toll business constitutes about 20 per cent of its revenue.



The Western Electric telephone plant at Chicago today

The whole manufacturing plant in 1877
(Two upper floors only)

Where your Bell telephone came from

It is forty-five years since a handful of men began making history and telephones on the top floor of the modest building at the right.

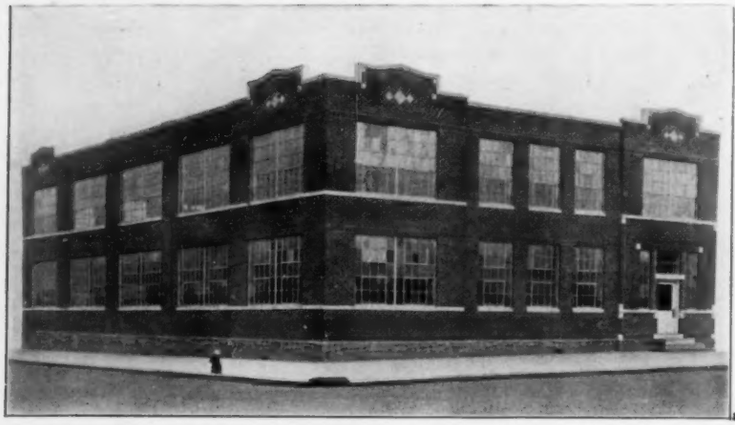
Today a plant which covers 200 acres and employs 38,000 people is needed to meet the demands of your telephone service.

The Western Electric works at Chicago now produces more than 2500 telephones a day, against a dozen a day in 1877. This increasing responsibility, moreover, has brought with it a need for more and more accurate equipment, which this Company has been able to supply only because of its constant touch with the problem.

The history of Western Electric is a record of experience in making telephones unique among electrical manufacturers.

Western Electric

Since 1869 Makers of Electrical Equipment



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Put your testing and measuring problems up to our engineering department

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HIGH GRADE
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HEAD RECEIVERS, MICROPHONES, KEYS, JACKS, PLUGS, ETC.
American Electric Company
MANUFACTURER CHICAGO, U. S. A.

BIG MEN THERE.

Southern California Telephone Meeting Is a Notable Event.

Fifty Independent telephone men of Southern California held a meeting in Pasadena March 2 under the auspices of the Pasadena Chamber of Commerce. C. A. Rolfe, of Pasadena, president of the association, presided. One of the interesting men present was F. R. Welles, the owner of the Constantinople Telephone Co. of Turkey who was for years executive of the Antwerp shop of the Western Electric. Mr. Welles told of the troubles met and overcome in the building of the lines and said that before the office could be opened the government required the company to buy two sheep and sacrifice them with great ceremony. E. H. Moulton, founder of the Tri-State Telephone system of Minnesota, and its president for many years, told of the business in that section. Alonzo Burt, president of the Missouri and Kansas Telephone Co. and secretary of the Chicago Telephone Co. was an interesting talker also. W. L. DeWolf, celebrated painter of desert pictures, a Chicago man and former president of the Kellogg Switchboard and Supply Co., spoke too. So did Samuel G. McKeen, president of the Ohio State Telephone Co. and one of the great minds of the telephone business. Kempster B. Miller, the expert used by Los Angeles in its recent experience before the Railroad Commission, told some of the problems of smaller companies.

Telephone Plant Meeting at Purdue, April 4-5.

A meeting that will be of much interest to telephone plant men of Indiana will be held at Purdue University, Lafayette, Ind., on Tuesday and Wednesday, April 4–5. The programs for the two days are devoted exclusively to plant matters and a number of interesting papers will be presented. The program is not yet complete but the announcements will be sent out in a few days. Among the papers that will be given are "Telephone Cable Distribution" by A. L. Staderman of Terre Haute; "Automatic Features of Central Office Switchboards" by J. W. Scott of Warsaw; "Accident Prevention" by R. M. Bennett of Chicago. In addition there will be papers on "Radio Telephony," "Transmission Maintenance" and "Joint Pole Line Construction". Arrangements are being made to hold district meetings of the Benton, Northern and West Central Indiana Telephone Association at Lafayette during the days of the meeting.

Harry Frankel, president of the Frankel Connector Co., N. Y., died recently of heart disease.

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Buy it of your jobber in ½-lb., 1-lb. and 5-lb. blue and white enameled cans and 50-lb. cans.
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Descriptive literature—free
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RUBBER COVERED
TELEPHONE WIRES

for every conceivable use. Braided, Leaded and Iron Armored Telephone Cables, Conductors straightway or paired.
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Fourteen years successful operation of our rebuilt equipment department puts it past the experimental stage. Quality and price will make you a permanent customer. Better investigate.
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GRAND LEDGE, MICH.
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SELL TO THE BELL.

Kinloch, of St. Louis, and Citizens, of Grand Rapids, Close Out.

Grand Rapids, Mich.—A tentative contract was signed in Detroit recently by the heads of the Michigan State Telephone Co. and the Citizens Telephone Co. of Grand Rapids for the purchase of the property of the latter at an approximate cost of $5,200,000. Subject to the action of the utilities commission the stockholders of the Citizens company and the Interstate Commerce Commission. The contract calls for the immediate payment by the purchaser of $3,800,000 with which to pay off the stockholders of the Grand Rapids company at par, and $1,400,000 to take care of bonds outstanding. The meeting of the stockholders, which is being held today, doubtless will confirm the agreement.

The Michigan State Telephone Co. also has applied to the Interstate Commerce Commission for authority to acquire control of the properties of the Valley Home Telephone Co., of Saginaw and other points in that state.

St. Louis, Mo.—Plans for merging the Kinloch Telephone System, of St. Louis, capitalized at $6,000,000, with the Southwestern Bell Telephone Co. of Missouri are about completed. Counsel for the Bell company, and E. F. Carter, general manager, appeared before the public service commission February 24 and outlined the proposition. The Bell proposes to buy all of the Kinloch property, including its long distance lines and subsidiary lines, for $4,200,000 in preferred stock of the Bell. The Bell is to assume all Kinloch debts, pay $100,000 in cash and take at face value $1,000,000 of stock the Kinloch company has acquired. The mortgages amount to about $5,500,000. The Bell company asks for authority to issue $7,500,000 cumulative 7 per cent dividend stock.

The White Deer Telephone Co., of Montgomery, Pa., is being taken over by the West Branch Telephone Co., of Muncy., Pa., which plans to make a number of improvements in the White Deer territory after the deal has been ratified by the stockholders.

The exchange of the Gulf States Telephone Co. at McGregor, Tex., twenty miles west of Waco, has been purchased by the Texas Telephone Co. of Waco. The consideration was $40,000. The Texas Telephone Co. also had an exchange at McGregor, and the exchanges have been consolidated.

OUR LITERARY DIGEST.

Review of Recent Articles on Telephony and Allied Subjects.

"Printing Telegraph Systems Applied to Message Traffic Handling," by A. H. Reiber, Journal of the American Institute of Electrical Engineers, February, 1922.

This paper discusses the application of printing telegraph systems for message handling in commercial and industrial enterprises such as use leased wires between offices or where orders must be transmitted to several departments in a single plant. The Morkrum, Western Electric and Kleinschmidt systems are described.

"Submarine Cable Telegraphy," by J. Willard Milnor. Journal of the American Institute of Electrical Engineers, Feb. 1922.

After a brief historical sketch, the construction and methods of operation of submarine telegraph cables is described. An analytical treatment based on an extension of alternating current theory is given for the types of cable and apparatus that may be considered standard at the present time.

"The New Clerkenwell Telephone Exchange," Electrical Review, London, Jan. 6, 1922. A description of a new common battery multiple exchange in London installed for the British Post Office Department. The present equipment is 7100 lines and the ultimate 10,000. This exchange is equipped to operate on 40 volt battery supply.

"Ueber Eichleitungen fur Nebensprechmessung," by K. Kopfmueller, Electrotechnisches Zeitschrift, Dec. 22, 1922.

An article describing the method of cross-talk measurement used in Europe by means of an electrical network calibrated in terms of Beta, l the product of the attenuation constant, times the length of line. Some of the sources of error are described and means suggested for the correction to be applied and for the design of networks that may be used without error.

Telephone Pioneers of America Meet at Cleveland, Sept. 30.

R. H. Starrett, 195 Broadway, N. Y., writes TELEPHONE ENGINEER advising that the annual meeting of the Telephone Pioneers of America will be held at Cleveland, O., with headquarters at Hotel Cleveland, Friday, September 29, and Saturday, September 30, 1922.